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JPRS-CST-87-010

11 MARCH 1987

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China Report

SCIENCE AND TECHNOLOGY

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JPRS-CST-87-010

11 MARCH 1987

CHINA REPORT
SCIENCE AND TECHNOLOGY

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NATIONAL DEVELOPMENTS

VICE PREMIER LI PENG DISCUSSES SENDING STUDENTS ABROAD

Hong Kong LIAOWANG OVERSEAS EDITION in Chinese No 51, 22 Dec 86 pp 3-4

[Article by Chen Lian [7115 6647] and Li Shaoshan [2621 1421 1472]: "Vice Premier Li Peng [2621 7720] Speaks on Improving the Work of Sending Students Abroad"]

[Excerpt] China's Policy of Sending Students Abroad Unchanged

Li Peng said: China's policy of sending students abroad is not an expedient, but an important component of the open-door policy, and a basic national policy which must be upheld over a long period. Therefore, the policy of sending students abroad in various forms will not be changed. We are not only talking about it in logical terms, but also acting on it in practice. This year, the CPC Central Committee and the State Council have specially discussed the work of sending students abroad and reached the required decisions. The number of Chinese students to be sent abroad during the seventh 5-year plan will be increased, and not decreased.

He then assessed both the positive and negative aspects of the work of sending students abroad. He said: "Since the 3d Plenary Session of the 11th CPC Central Committee, the state has sent more than 30,000 students abroad with government funds. Many others have also studied abroad with private funds. Based on our plans and requirements, more than 16,000 persons have completed their studies abroad and returned home. We can say that our work in sending students abroad has been a great success in the past several years. It has played a positive role in enabling us to learn from the advanced sciences and technologies as well as management experiences of foreign countries, to train our highly specialized personnel, and to improve the competence of our personnel.

"Most of the persons studying abroad have behaved well. They love the socialist motherland, study diligently with good results, abide by the law and respect the social customs of the host countries, and get along with their peoples. Many of them have also made new discoveries and breakthroughs in scientific research which are highly regarded at home and abroad. They have won glory for the motherland. Those who have returned to China after completing their studies abroad have given outstanding performance in scientific research, education, production and other fields. More and more of

them have become backbone elements in various trades and professions, and made positive contributions to the four modernizations.

"Of course, it cannot be denied that some problems exist in this work, mainly because the chosen disciplines and special courses are not closely coordinated with the national construction program. In some cases, there is a dislocation between studying and application. There are also other shortcomings in our work which have prevented us from making full use of the returned students. We must be aware that for a long time, China has been closed to the outside world. When its doors are suddenly flung open and tens of thousands of people are studying abroad, there should be no wonder that some problems would crop up. As long as we face the defects squarely and realistically, review our experiences, and continue to make improvements, we should be able to do a better job of sending students abroad.

"Based precisely on these considerations and acting in accordance with the spirit behind the decisions of the CPC Central Committee and the State Council, the State Educational Commission, after repeated deliberations and solicitations of comments from people in all walks of life, have recently formulated "Certain Regulations Concerning the Work of Sending Students Abroad."

Our correspondents asked: "Some people said that the main purpose of these documents is to prevent the outflow of talents. Are they correct?" Li Peng called this a misinterpretation. He said: Neither the documents of the CPC Central Committee and the State Council nor the specific rules formulated by the State Education Commission are mainly aimed at the prevention of the outflow of talents. The dominant spirit behind these documents can be summarized in these words:

Sending People to Study Abroad According to Our Needs, Ensuring High Quality, and Studying for the Purpose of Application

Li Peng then explained the full meaning of these words. He said: In the past, the choice of disciplines for the students studying abroad was not rational. For such theoretical disciplines as mathematics and physics, the number of students sent abroad has been somewhat excessive; and for the disciplines of application and management which are needed for national construction, the number of students is too small. Some persons have studied certain subjects which cannot meet the state's urgent needs. As a result, these people cannot be put to full use after the completion of their studies and their return to China. The so-called "sending students abroad according to our needs" means sending them according to the requirements of the four modernizations and with greater emphasis on the study of applications and management subjects. Due importance should be attached to disciplines of a theoretical nature, and continued efforts should be made in sending people abroad to study them. In the future, however, we have to increase the number of students of social sciences and literature and arts so that the finer aspects of foreign culture and ideology can be assimilated and used in China. At the same time, the proportions of students sent to different countries through government funding should be appropriately readjusted. Every country,

regardless of its size, has its merits. We must uphold this principle before we can learn from the strengths of various countries extensively.

Li Peng continued: In view of the fairly great developments in higher education and the rising standards of teaching and scientific research in the country, the training of graduate students should hereafter be based in China. In sending students abroad with government funds, therefore, we should give priority to the visiting scholars and the students of advanced courses with guaranteed results as a precondition. Except for linguistics and some other specialized subjects, we will generally send no more regular college students. We will suitably reduced the number of masters candidates and increase that of doctoral candidates, and open more channels of cooperation between China and foreign countries in scientific research and in training PhDs.

Li Peng said: Reform should be conducted in the enrollment of students to be sent abroad in order that they will study for the purpose of application. In the future, the majority of graduate students studying abroad with government funds will be sent by the units in need of their services, while a small number of them will be sent according to the state's unified arrangements. The advantages of their being sent by the units are: first, the specialized courses and subjects chosen for these students will be compatible with China's domestic needs; and second, it will be easier to conduct comprehensive checks on the ideology, integrity and professional competence of the students so as to ensure high quality.

A correspondent asked: "Some of the students are studying abroad with private funds. What is the policy toward them?"

Same Policy for Students Going Abroad with Either Government or Private Funds

Li Peng said: Foreign education financed by relatives or friends is also a method of personnel training to be actively supported. The state shows the same concern and care for students studying abroad with either government or private funds. It will help them solve their problems and encourage them in the same way to complete their studies and to serve the four modernizations upon their return to China. Those studying abroad with private funds and having obtained their BA or higher degree will be given state assistance in the way of payments for their return trip and their household expenses in China. They will also enjoy the same treatment as given to the students with government funds in job assignment or employment. They will be appointed according to their ability and given the opportunity to demonstrate their merits.

As to the question of "postdoctorate" research, Li Peng said: This is a matter of general concern, and we are taking a realistic approach. We will support any research or practical project as long as it is useful to China's science and technology. Even though some projects are not immediately needed, but may be useful in future, we would nevertheless support them, as long as conditions permit, and provide the facilities in the procedures of examination and approval.

Li Peng also talked about the question of home leave for students sent abroad with government funds. He said: As you know, the state does not have much foreign exchange on hand; yet we have set up certain rational rules concerning home leave. For example, if a student is expected to stay abroad fairly long, he can enjoy home leave with pay once. By this means, he will be able to have a reunion with his family and at the same time gain a better understanding of actual conditions in China. This understanding will help them to study for practical use in light of reality. If a student is sent abroad with government funds and his spouse wants to visit him, we have also given the matter due consideration and accordingly worked out the regulations. Li Peng added: On this question, we must be aware that China is still a developing country with limited economic resources and cannot emulate the developed countries.

After talking about the reform measures for the work of sending students abroad, Li Peng pointed out: The regulations worked out by the State Educational Commission now, compared with the previous regulations, is more flexible in some, but stricter in other respects. However, they are based on conditions in China and a review of our practical experiences over the past several years and are, therefore, more rational and closer to perfection. Now people seem to think that strictness means tighter control and flexibility means relaxed control. This rough interpretation of strictness and flexibility in terms of control is incorrect. If our decision to send no students or fewer students abroad is interpreted as tighter control, then how can it be claimed that we have tightened the control when we have not actually reduced the number of these students, and their qualities will be even better? Li Peng recalled that on his visit to England, someone asked about the requirement for each student studying abroad to pay a deposit of 20,000 yuan as a precaution against the outflow of talents. Li Peng replied with a laugh: I have never heard of such a regulation!

Confidence in Students Sent Abroad

Li Peng said: I believe that most of the people sent abroad love their socialist motherland, hope to see a strong and wealthy motherland, and are willing to contribute what they have learned to the motherland's four modernizations. We do not have to worry about their not coming back. As the situation now stands, some of them have returned as scheduled, while others have postponed their return. Of course, we hope those sent abroad according to state plan will return as scheduled to plunge into the task of four modernizations. This should be helpful to our entire work program. However, some of them have to come back a little later for some reason. This is understandable.

Li Peng also recalled his discussion with some new and old returned students. They talked about the school life of those sent abroad in the 1950's, and then the conditions of those spread out over the five continents today. They all had a common feeling: studying abroad is a painful experience. Although living conditions abroad may be better, they still had to undergo a period of hardship because of their separation from home, the lifestyle to which they were unaccustomed, the language difficulty, and the need to study under these conditions. Though physically abroad, these students still had the motherland

in mind, and were apt to compare everything they saw with their motherland. They were very eager to complete their studies and return to serve the motherland as soon as possible. The conditions under which they grew up, the environments of their study, and the mode of education they receive may be different for the students of two different generations; but they have the same love for the motherland and the same desire to bring prosperity to the Chinese nation. The political conviction of the Chinese students abroad, formed in the course of their life work, cannot be changed by anybody.

Be Prepared To Work Hard as Pioneers

Then he said with deep emotion: "In a magazine, I read about the five generations. The first generation refers to those students sent abroad by China during the period of Westernization Movement, and Dr Sun Yat-sen, the forerunner of China's democratic revolution, was one of them. The second generation refers to the proletarian revolutionaries of the older generation including Zhou Enlai and Deng Xiaoping. The third generation refers to the scientists including Qian Xuesen [6929 1331 3773]; the fourth generation, those of the 1950's; and the fifth generation, those who are now abroad. Conditions for the fifth generation are much better than before. Science and technology are now developing rapidly, and they are able to learn more advanced knowledge. They have active minds, a great variety of knowledge, and many strengths and fine points we do not have. Such is the law of historical development: each generation is stronger than the preceding one. We are placing our hope on them, and, of course, on those who are even more numerous in China as well. Many of them will serve as pillars in building the future motherland."

Before the conclusion of his talk, Li Peng gave this advice to those who were about to return after completing their studies: "Anyone who wants to become useful must be prepared for hard struggle." He said: After returning to China, they will find the living conditions not so good as in foreign countries. The state will certainly give them some assistance, but such assistance can only be limited because of its limited financial resources. Furthermore, their living standards should not be too much higher than those of the broad masses. Their material conditions will certainly not be as good as in foreign countries; this will mean greater hardship. However, the hard struggle I mentioned earlier refers not only to daily life, but also to their professional career. There will be twists and turns in their professional career, and they must be prepared to work hand in hand with their comrades in China as pioneers. It must also be understood that the knowledge and technology learned abroad must be coordinated with the practice in China. They must be prepared to encounter difficulties and setbacks in their careers and academic research. They must have an indomitable spirit and go through repeated tempering before they can be truly useful during China's vigorous development.

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NATIONAL DEVELOPMENTS

SCIENCE PERSONNEL EMPLOYMENT PROBLEMS DISCUSSED

Beijing BEIJING RIBAO OVERSEAS EDITION in Chinese 13 Dec 86 p 4

[Report by Xiao Guangen [5618 7070 2704]: "Shanghai Deliberates Status Quo Regarding Employment of Science and Technology Personnel, Proposes Gradual Freeing Up of Resignation and Concurrent Employment Policies"]

[Text] At the Shanghai Conference on Personnel Employment and Related Research that convened 8 December, the Shanghai Personnel Office and the Office of Science and Technology Cadre director Shi Tao [4258 3447] proposed that we should gradually loosen policies regarding quitting and concurrent employment for scientists and technicians, and permit specialist technical personnel to work concurrently at other organizations and design units with operational licenses.

Shi Tao said that the policy regarding quitting is an important guarantee of the freedom given to specialist technical personnel to choose their employment, and should be gradually opened up. For all units that have already implemented hiring systems, and science research, higher institution, educational system units where personnel are more concentrated, as well as units with more people than work, an individual may request to quit; where specialized technical personnel request to be leased or contracted to small to medium enterprises or science research units; where there are requests to go to old established or minority frontier areas and to suburb and county town and township enterprises; where there are requests to go to enterprises funded by foreign commercial interests and to use foreign funded projects, in all these cases quitting is permitted. It is recommended that the central authorities be more open about units where Shanghai personnel are more abundant, where they should permit quitting. After the gradual loosening up of the system and for persons who have left as just described, there will be a gradual and full-scale implementation of the policy permitting quitting in accordance with conditions. For those who have quit since 1984 and for whom paper work has not yet been handled, in principle the units all want to allow quitting, but there are reasons such as vacancy filling procedures and transfers. For individuals who might have this or that problem in regard to quitting, it should be determined whether this is a phenomenon apparent during the reforms because of unclear policies or lack of complete restructuring measures, and this should not be blamed on the party concerned.

Shi Tao said that we should go further in loosening our policies regarding concurrent employment, do a good job with relations between the main job and the part-time one and with the internal problems of remuneration allocation. To this end, we should do a good job with management of the first job. If the first job has not been managed well due to unreasonable allocation of duties or because examination standards have not been clear, administrative measures should be adopted, and where rigid rules do not permit concurrent employment, this is inappropriate. If we do a good job with legislation regarding concurrent employment, legal management of extra-curricular employment will avoid abuses that could arise.

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CSO: 4008/2034

NATIONAL DEVELOPMENTS

SCIENCE INFORMATION SYSTEM'S ROLE, RESTRUCTURING EXAMINED

Beijing KEJI QINGBAO GONGZUO [S&T INFORMATION WORK] in Chinese No 7,
25 Jul 86 pp 10-11

[Article by Lin Chunxu [2651 2504 2485]: "Some Views on the Restructuring the Information System"]

[Text] Reforms on the frontlines of science and technology information have been going on for more than a year, and many newborn things have sprung up during the restructuring fully manifest the innovative and explorative spirits of the public. The majority of these things have undergone empirical examination and have shown their own vitality, whereby they will continue to exist and develop; with shifting time, some will perhaps be proven to be unscientific and unreasonable, and will consequently be made obsolete by history. In the process of restructuring, if we reflect upon the past in good time and calmly, and pose questions, we will continue to rectify the forward directions, which is necessary and beneficial.

Extend the Scope of Service and Maintain Our Own Characteristics

The restructuring of the economic system and the science and technology system will allow the science and technology information effort to face up to a completely new social environment. It is not right that science and technology information sectors should be alone in satisfying the information demands of science research, production, and teaching. Nor would it be right for them to be alone in collecting, processing, handling, and passing on information in document form, or to solely rely upon their own capabilities to promote science and technology information for all of society. The development of objective trends require that science and technology information sectors expand their own service objectives, extend their own service scopes, advance their own service modes, and socialize the science and technology information system as quickly as possible. Even though this is so, science and technology information sectors should still not lose their own characteristics and should not lose their independent position within this large system in society. We do not deny getting involved with information in the aspects of politics, economics, society, and culture in our science and technology information service, nor do we eliminate the information materials needed by material production sectors, knowledge production sectors, and administrative management sectors, which include large quantities of science

and technology information. However, we cannot obtain from this the conclusion that this kind of science information is all science and technology information, and consequently we regard the work that should be done in other systems (including the testing and production of material goods) as their "share" of the work.

Conceptually speaking, science and technology information efforts have clear connotations and extensions. Speaking structurally, this is a subsystem of a large social system; functionally speaking, it has a special, irreplaceable function. Even so, many kinds of professions abroad, such as broadcasting, television, news, publishing, information, patents, libraries, archives, and communication, are referred to generally as information industries. However, because of the characteristics of semantics and traditional conceptions, in this country the concepts of information and news are distinct. The generation of news has not yet constituted an independent profession in this country, while science and technology information efforts truly exist in a working sector. During the restructuring, although all sorts and manner of changed circumstances need to be met with, there are a multitude of questions about names that need resolution, and there are broad fields in which we need to be involved. Science and technology information is just science and technology information, and we cannot confuse it with ordinary information. We cannot confuse science and technology structures with other information organizations in society, nor can we confuse the collection, arrangement, transmission, and study of science and technology information with information efforts in the broader sense. For otherwise, the independent existence of science and technology information structures could be questioned, nor would it be necessary for science and technology information work to have specialists to do it.

Speaking from the point of view of the science and technology information system throughout the country, there are more abundant sources of documents, higher levels of research personnel, more powerful information processing capabilities, and information networks of a preliminary scale. Those in science and technology information sectors should be confident, strong, and self-sufficient, should make the most of their advantages, and should get involved with the powerful currents of economic and science and technology reforms.

Organize and Construct in Keeping with the Socialization of Information

The establishment and perfection of information organizations at all levels is a guarantee of doing a good job of science and technology information efforts. In the restructuring, whether it be the science and technology information system or other related systems, they are all organizations made up of different categories and different forms with the goal of dealing with news. According to materials estimates, the number of various news companies, news organizations, and news networks at the prefectural or municipal level or above could break four figures. These rising new "industrial blocs" have played a particular role in collecting news, transmitting information, developing consulting, and invigorating the technology markets. That being so, within "industrial bloc" news there are the problems of uneven development, unequal distribution, non-uniform standards, and unstable

positions. Aside from a minority that can maintain their news service directions, the majority "focus on one industry, tolerating others"; the smallest number of organizations have turned things all around, and in the name of news services engage in other operational activities. The reasons for these problems are many, but speaking to the guiding thought behind organizational establishment, that it has not grasped the fundamental principle of "what is needed and possible" is the crux of the matter.

At present, all professions and industries are demanding the socialization of science and technology information services. They want both socialization without the elimination of proper competition. We have no authority to block other sectors and industries from establishing new information structures or organizations, but the socialization of information certainly does not signify the flowering of information structures all over the place. This is a problem of coordinated development. We should investigate, analyze, and study just how great the needs of society for information are, whether existing information structures can be responsible for these demands, whether they should be increased or expanded, how this work should be done, etc. For these reasons, the socialization of information cannot only rely upon the establishment of organizations, the set up of structures, and the increase of personnel for resolution, but should rely on the implementation of the division of labor in society of information efforts, the sharing by society of information resources, and the movement in society of information personnel. Some regions have set up rural science and technology information news networks that are not divorced from production, and some units have invited "guest information researchers," all of which are feasible methods.

The Commercialization of Information and Laws of Value

In science and technology information circles, people are speaking more often of the commercialization of information. From the point of view of the whole process of sources, processing, circulation, and usage, there are formal similarities with commodities; from the point of view of information being able to enter into the practice of the technology markets, there are also similarities with the nature of material commodities. Consequently, exploring the problems of the commercialization of information has an extremely important factual significance.

Everyone knows that commodities are products of human labor and are used in exchange, and that they have value and usage value. Information products are products of human intellectual labor, they may be used in exchange, and they have value and use value. However, information, which is a knowledge product, both has things in common with material products and also has things that are unique. Where the two differ are in: the object that bears the value is not the same; the goals of production are not entirely the same; the results of production are not the same; the means of social restrictions are not the same.

However, if some information products enter the technology markets as commodities, then implementation of a compensated exchange is permissible. Actually, throughout the restructuring some information products have entered the markets. For example, the marketing of publications, the reference to,

translation of, and copying of documents, as well as audio-visual services. Overall, information work is a socially beneficial occupation, the value of which is primarily manifested in the overall results for society.

The value of information products should be analyzed in terms of the law of value. According to the theory of the law of value, the value of any commodity is determined by its social average necessary labor, and its currency expression is in the form of price, which fluctuates above and below value. The price of any single information product can change a great deal, but from the point of view of the socially necessary labor, the value amount of information should be certain. Consequently, the algorithm for the information value that is cost plus profit is: $R = c + v + m$, which is reasonable. We could go so far as to say that for some information products there can be a deduction for income, or they can be priced in accordance with a multiplier over cost, which can be deficient on a theoretical basis. If a high volume of income is derived in this way, it is certainly not the same as if the information had truly created that much value, but only shows that before scientific management of the technology markets, science and technology, as well as material product sectors, will themselves create a portion of value to shift toward the information sector.

The value of science and technology information products cannot possibly be substituted for the value of scientific and technical achievements, and even less can they replace the value created by the material products sectors. There is no doubt that to put new information materials into the hands of scientific and technical personnel and producers is, then, direct participation in the process of creating new material wealth. Consequently, this is merely one portion of the final product value for the material products sector. This portion of value is determined by the average socially necessary labor to produce the information product. It is not appropriate to artificially seek after the economic results from science and technology information. In the restructuring, the compensated services for information should respect the law of value and be founded upon service in the formulation of reasonable pricing. There should not be a blind demand for high prices or an expansion of the scope for receiving fees, which would destroy one's own reputation.

Restructuring and Doing One's Primary Job Well

The main points during this restructuring of the science and technology system are to reform the allocation system; to adjust scientific and technical structures to promote the commercialization of technical achievements and to strengthen the capacity of developmental research; and to change the personnel management system. Although the science and technology information sectors will still make use of the method of operating expense contracts, in changing the operations systems this will strengthen their own vitality and enliven the aspect of personnel movement to be uniform with the restructuring of the entire science and technology system, since both can operate without contradictions.

If we are to restructure we must eliminate some systems, mechanisms, provisions, and methods that are not in keeping with the demands as trends develop. We must be bold in doing things that are unconventional, as for example with the already commonly implemented institute director responsibility system, the personnel employment system, the provisions regarding the transfer of rights to technologies, and methods for bonus allocations. It is worth noting that we cannot generally blame things that we did not do in the past or that we did not do well on the restraints of the system. For example, the tasks of collection, arrangement, cataloging, shelving, and lending out of library materials have always had a set of basic effective methods, and that should have been done well. Or also, personnel of all levels and types in science and technology information sectors and each functionary administrative office have always had or should always have had clear work tasking and scopes of responsibilities, which should be followed. Regarding the system for checking on work attendance, this is even more the most minimal requirement for a unit. For these reasons, those things that take the name of reform and that make sole use of economic means to motivate the enthusiasm of science and technology information personnel are not the points of emphasis and the goals of restructuring.

What the restructuring of the science and technology information system should resolve are primarily those portions of systems and operational mechanisms that restrict and bind the enthusiasm of information personnel, and that obstruct and affect making the most of information structures. After restructuring, science and technology information efforts should be manifest in the changes from closed models to open ones, and in the highly efficient information system that for all of society both divides its labors and is coordinated.

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CSO: 4008/2034

NATIONAL DEVELOPMENTS

RESULTS OF NEW POLICY ON OPEN INSTITUTES, LABS REPORTED

Beijing BEIJING KEJIBAO in Chinese 28 Nov 86 p 1

[Article by Shi Wenjie [0670 2429 1240]: "Open Institutes (and Laboratories) of the Chinese Academy of Sciences Produce Results"]

[Excerpts] Open institutes and research laboratories are one of the important matters for the restructuring of the science and technology system, and after nearly a year of bold practice, the Chinese Academy of Sciences has obtained gratifying results.

To strengthen relations and cooperation with higher institutions and the industrial sector, as well as to create an environment conducive to carrying out this cooperation, last year the Chinese Academy of Sciences selected 19 high level institutes and research laboratories with relatively advanced equipment to be opened to the rest of the country and to foreigners. The opening the institutes and laboratories has promoted the faster and better production of research achievements by these institutes (laboratories).

The Organic Soil Chemistry Laboratory of the Guiyang Soil Chemistry Institute has reached international advanced standards in its research on salt lake deposits, coal measure layers, and continental oil-bearing rock biological indicator chemical compounds, and especially on sulphur-bearing chemical compounds; not only has the Solid-Body Atomic Imaging Laboratory of the Shenyang Metallurgy Institute made breakthroughs in quasi-crystal alloy chemistry and structural research, in which they are in the front ranks internationally, they have also combined high-resolution electron microscope technology with electron diffraction, and in high temperature alloy extraction of facies, they have discovered 7 new facies, they have observed abundant microscopic structures, and broken through a barrier of 20 years standing for crystal structure research of metal topological close-packed facies to the acclaim of international academic circles; cooperation between the Beijing Electron Microscope Laboratory and the American Bell Labs has undertaken failure analysis of large scale integrated circuits to come up with remarkable achievements that are currently being disseminated and applied. This will promote the development of the semiconductor industry in this country.

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CSO: 4008/2034

NATIONAL DEVELOPMENTS

NDSTIC TRANSFER OF MILITARY TECHNOLOGIES TO CIVILIAN USE

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 18 Dec 86 p 4

[Report by Li Peicai [2621 1014 2088]: "More than 400 Technologies Transferred to Civilian Use Gain Results, National Defense Science and Technology Industrial Commission Serves Society in All Fields"]

[Text] Units of the National Defense Science and Technology Industrial Commission (NDSTIC) have made the most of their advantages in skilled personnel, equipment, and automation management to transfer 427 military technologies to civilian use this year, directly serving national construction and gaining outstanding results.

In August 1986, on the principles of mutual benefit and reciprocity, the NDSTIC took on the responsibility for overall technology planning, design, and implementation for the first stage of the Pangang project, and signed contracts. This is one of the large development projects under the unified organization of the NDSTIC department of applied technology development. The Pangang Company first stage project that set up a computer management system with the help of the NDSTIC will quickly, accurately, and comprehensively gather data pertinent to production operations, and through analysis and synthesis they can provide effective information for management personnel at all levels; establishing both exclusive and shared databases, they can both allow management personnel to be freed from numerous reports and can also expand their scope of operations, which will improve efficiency and precision.

To more broadly transfer science and technology to society, the NDSTIC also adopted varied formats to develop lateral associations with local units, and to develop the activities of technical cooperation, technical services, and the transfer of technologies. Among these more than 400 projects that have been developed, they not only serve industrial enterprises, but also to the various fields in national economic construction of organization management, urban construction, medicine and hygiene, environmental protection, and culture and education.

12586
CSO: 4008/2041

NATIONAL DEVELOPMENTS

TECHNOLOGY IMPORT STRATEGIES EXAMINED

Hefei ANHUI RIBAO in Chinese 5 Sep 86 p 4

[Article by Zhu Wengen [2612 2429 2784]: "Personal Views on Anhui's Import of Technology"]

[Text] There are currently three main points of view concerning the question of importing technology into Anhui: one advocates importing advanced technology; another attaches equal importance to importing advanced technology and applicable technology; and the third advocates importing "intermediate technology."

In the opinion of the writer, Anhui should strive to import advanced applicable technology and import the most advanced technology aimed at a limited number of targets.

Our country is still very poor and Anhui's funds are limited. When Anhui imports technology, it must use the limited funds where they are most needed. How do we know that we are using them where most needed? Is it most needed in importing advanced applicable technology? Or in importing "intermediate technology"? Without doubt, advanced applicable technology has potential for future development; but "intermediate technology" has already been or will soon be rejected in developed countries, so that its days are numbered. Strictly speaking, importing "intermediate technology" means importing the rejects of developed countries. In addition, in importing advanced applicable technology, priority must be given to equipping Anhui's large and medium enterprises and bulwark enterprises, allowing them to play their roles of "backbone" and "head that leads the dragon."

The basic goal of importing advanced applicable technology is to greatly improve the ability of products from Anhui enterprises to compete in the domestic and international markets. Because "intermediate technology" is technology that developed countries are flocking away from, importing this kind of technology will certainly cause the products of Anhui enterprises to lose their competitive ability in the international market; even if the products have a little competitive ability, it is a minute amount. The national situation is that every province and area is opening up to the outside world and importing technology. Jiangsu, Zhejiang, Shanghai, and other coastal provinces and cities, along with many other inland provinces and

areas, are all making advanced technology the main focus of their imports. If Anhui imports "intermediate technology," it will hardly be able to contend with stronger competitors in the domestic market, not to mention the lack of competitiveness on the international market. May I ask, what is the significance of such imports?

Some people worry about Anhui's backwardness, the low management level, the poor industrial foundation, and the low educational and technical level of workers, and wonder whether we will be able to master the advanced technology if it is imported? This question cannot be given a simple answer, rather, we must analyze the specific details. The management level, the industrial foundation, and the workers' educational and technical level are not balanced in the province as a whole. In Anhui's 8 large and medium cities--Hefei, Bengbu, Wuhu, Huainan, Huabei, Ma'anshan, Tongling, and Anqing--industry is relatively developed, technical forces are concentrated, transportation is convenient, economic strengths are abundant, and the management level and the workers' cultural and technical level are rather high. These cities are able to digest and absorb advanced applicable technology, quickly turning it into productive forces. When we talk of giving priority to transforming the technical foundation of large and medium enterprises and bulwark industries, these large and medium enterprises and bulwark industries are primarily divided among the 8 large and medium cities. These 8 large and medium cities are a good foundation for Anhui's importing of advanced technology; we must not overlook this fact. When we look at problems we must prevent "over generalizations." "Over-generalizing" hides the imbalances and diversity in Anhui, and buries Anhui's advantages and strengths.

There are also some comrades who feel that Anhui should first take small steps in importing technology, taking several small steps before taking any big steps, otherwise we will run out of reserved energy, and our desire for haste will prevent our success. Their intentions are good. However, every province and area is currently scrambling to get ahead, spurring their galloping horses; if we are still taking small steps here, won't the gap get bigger and bigger? When we are ready to take big steps, everybody else will already be flying high, too far ahead for us to catch up. Everyone knows that the world's new era of technological revolution is a challenge to all developed and backward countries, but it is also an opportunity. This "opportunity" has opened the door widely to everyone; whoever gets his foot in first will win the opportunity. So, will those who first take small steps and then take big steps get it first? Or will those who move forward quickly, with all their speed, get it first? We should say that it is the latter.

The question now arises of how to view this "reserve energy." Viewed from one angle, sometimes leaving enough "reserve energy" is very useful, but at other times, leaving "reserve energy" is not very useful. Even though one may have "strength to move mountains and a spirit unmatched in this age," there is no place to show one's ability. An athlete says, "I want to save enough energy in the preliminaries so that I can do well in the final competition," but by saving his energy, he does not get the results he should have and fails to qualify for the final competition. There is no place he can use the "reserve energy" he has saved. This illustrates that we should change with the times, and use our energy where it is most needed; viewed from another angle, does

"taking small steps" really give us "reserve energy"? Does it really leave so much "reserve energy"? I fear it is quite difficult to give an affirmative answer. If we now proceed forward quickly, with all our speed, does that mean that later on we will definitely not have "reserve energy"? In my opinion, not necessarily; it is also possible that the powerful momentum and propelling force formed by moving forward at top speed will create an even greater "reserve energy." "Taking small steps" and "having reserve energy," and "moving forward at top speed" and "no reserve energy" really do not have an inevitable cause-effect relationship. This question is worth serious consideration. "Taking small steps, having reserve energy" is not a law of nature or a universal truth. After the Second World War, Japan's condition really was not better than China's, nor was it better than Anhui now. In that case, how did Japan in the short span of 40 years develop so rapidly? There are certainly many factors here, but Japan's development mentality perhaps was not to first take small steps and then take big steps, but rather to aim at the opportunities and move forward at top speed.

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CSO:4006/38

NATIONAL DEVELOPMENTS

TECHNOLOGY MERCHANDISING REPORTED

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 7 Dec 86 p 4

[Report by Wu Ming [0702 2494] and Meng Xiangjie [1322 4382 0267]: "A Group of 'Science and Technology Merchants' Emerges from the Chinese Academy of Sciences"]

[Text] A group of "science and technology merchants" who both understand science and also understand economics has emerged from the Chinese Academy of Sciences. This new type of science and technology entrepreneur is playing an ever growing role in things like the development of new products, the transfer of rights to achievements, and scientific and technical consulting. According to statistics, in a large group of the technical development companies established in the Academy in recent years, more than 1,200 scientists and technicians with high or middle level posts have been directly or indirectly involved with scientific and technical economic activities.

For scientists and technicians to engage in economic activities breaks up traditional conceptions of value. Currently, more and more people believe that the value of scientists and technicians is not seen only in the extent of their contributions to society. They say that to allow the most rapid transformation of science and technology into production forces requires a group of scientists and technicians to leave the institutes and the laboratories and especially take up the development of new products, the transfer of rights to achievements, and scientific and technical consulting. Wan Runnan [8001 3387 0589], formerly a software engineer at the Chinese Academy of Sciences Computing Center, and a group of young and middle-aged scientists and technicians who had left their jobs jointly began a science research and development group enterprise together with the Sijiqing Township of the Haidian District of Beijing--the Beijing Sitong Group Company, which has developed more than 10 projects, their volume of operations last year reaching 32 million yuan. A group of graduate students from the Institute of Computing selected a very difficult course for their business. They set up the H Computer Company, and developed the model H-01 Chinese teaching computer, which has been warmly welcomed by users.

The facts have shown that science and technology enterprises can be a new type of technical industry, which requires that the operators be both familiar with the business and also good at operations. In the 80 technology development

firms in the Academy of Sciences, one can see suave representatives meeting prospective customers at the doors. By their degrees of familiarity with products, it appears that they are the inventors of the new products, while flexible modes of operation keep people from imagining that these are scholars with great degrees of knowledge. The general manager of the Keli Company, Tu Yan [14583543], is a scientific and technical person with a high post in the Institute of Acoustics. He not only knows the computer business, but also understands commercial operations, and under his organizational guidance the Keli Company has developed into an entity that combines science, industry, and commerce.

This emergence of a large group of "science and technology merchants" has infused new vitality into the Chinese Academy of Sciences, turning around the situation of the past where "the day achievements were reported was a time when the entrance halls were deserted." According to incomplete statistics, the rights to more than 400 technical achievements have been transferred, and by activities such as the development of new products and the development of technical consulting, income has been 40 million yuan.

12586
CSO: 4008/2030

NATIONAL DEVELOPMENTS

INSTITUTE DIRECTOR RESPONSIBILITY SYSTEM DISCUSSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENCE OF SCIENCE AND MANAGEMENT OF S&T] in Chinese No 11, 12 Nov 86 pp 4-5

[Article by Chen Jianmin [7115 0256 3046], Chinese Academy of Sciences: "Some Opinions on the Institute Director Responsibility System"]

[Text] Since the proclamation of the "Resolution by the CPC Central Committee Regarding Restructuring of the Science and Technology System," and with the ever deepening development of the restructuring of the science and technology system, reform of the leadership system within the science research organizations is also unfolding, and at present a number of science research organizations have implemented institute director responsibility systems. Consequently, this change in low efficiency administrative guidance has created beneficial conditions for carrying out reform of the leadership system.

Since the founding of this country the leadership system within our science research organizations has largely gone through three stages, namely: the party committee responsibility system, the institute director division of labor responsibility system under the guidance of the party committee, and the institute director responsibility system. These three different leadership systems are in conformance with the needs of the multi-stage development of the economic and scientific and technical endeavors.

Our current implementation of an institute director responsibility system is a necessity of historical development and is necessary to the development of scientific and technical endeavors in this country. The reasons for this are, first, that the institute director responsibility system under the guidance of the party committee lacked a distinct responsibility system. Responsibility was disparate, which directly affected and weakened the efficacy of science research administrative guidance. Second, reform of the science and technology system demands that science research organizations be oriented toward society and progressively become autonomous research and development entities, and become independent legal entities. In this way, the ownership by the state of science research organizations is sure to be separated from operations and management authority. The representative of the legal entity that is the research institute--the institute director, must guarantee that he can fully utilize its authority for administrative guidance and its highly

effective, autonomous determination of administrative and vocational problems of the institute in order to accomplish the science research mission for the nation and other science research tasking as commissioned by the state. Third, implementation of the institute director responsibility system can better resolve the division between responsibility and authority, which will enable each cadre in the party government internal to the institute to fulfill his responsibility, to use his authority, and to make use of his capabilities to the fullest, which will arouse the socialist enthusiasm and creative spirit in scientists and technicians at large. Actual experience has shown that for science research units to implement the institute director responsibility system results in quite a bit of vitality.

I. We should correctly understand the relations between party and government within the science research organizations.

Implementation of the institute director responsibility system means to turn over the vocational and administrative command authorities for science research organizations to the institute directors, where the institute director is responsible to the state and to the staff of the entire institute. This will elicit corresponding changes in the divisions of labor between the party and the government within the institute. Party organization in the institutes should make two changes: change from overall leadership to ideological and political leadership; change from overall decision making regarding administration and vocations to an assurance and monitoring of administrative and vocational decision making. The primary responsibilities and mission of the party organization are changed to an assurance and monitoring of the implementation of party and state principles and policies through ideological and political efforts. It is also to support the effective guidance of administrative guidance systems, the unity and mobilization of scientists and technicians at large to make more contributions to the science and technology undertakings in this country, and to promote the advancement of science and technology efforts. Some people have summed up the relations between work at the party organization level and administrative and vocational efforts after implementation of the institute director responsibility system in three phrases: the assurance should not be monopolistic, the monitoring should not be hypercritical, and participation should not be obstructive.

What must be pointed out is that implementation of an institute director responsibility system definitely does not signify a division between party and administration within the institute. The party organization and administrative guidance within the institute should be an organic level of leadership, and it should make concerted efforts, be in close accord, be mutually supportive, and be mutually understanding. As the institute director is exercising the authority of his office, he should wholeheartedly listen to and respect opinions and suggestions of the party organization. And the party organization should actively guarantee and monitor the correctness and efficacy of the guidance exercised, and support this implementation of the institute director responsibility system.

II. Establish a highly effective administrative guidance system

After implementing an institute director responsibility system, many institute directors have complained that they have been buried beneath a pile of trivial tasks, that they run around all day, bringing in another large pile of opinions. Some have even indicated that their energies and stamina cannot be maintained, and only hope that after their term of employment has expired they will be able to release their burdens.

We believe that implementation of an institute director system is not the same as implementation of a "system of one-man leadership." The institute director responsibility system should be a highly effective administrative guidance system, and the institute director should put his own guidance scheme into effect through various responsibility systems and through each functionary department to carry out his own guidance authority. In this system the institute director is the guidance center, and together with this should be advising structures, decision making structures, management structures, and monitoring assurance structures. Under science decision making, these structures should accurately carry out the resolutions of the guidance center. Administrative guidance systems of this sort require that the institute director place his main energies into controlling the facilities in the institute for overall strategic thinking, science research directions, the formulation of regular planning, and of functionary departments, as well as the staffing of cadre, and the discovery, use, and training of outstanding talent. The institute director should entrust the deputy institute directors and the functionary departments to help take care of daily management tasks, should not gather major and minor affairs onto himself, and should refrain from doing the work and taking on the responsibilities of the functionary departments. Only in this way can the institute director extricate himself from the pile of affairs and truly assume the responsibilities he should assume.

III. How is the decision making of research organizations to be managed?

After implementation of institute director responsibility, the institute director has decision-making authority (also called determining authority) and guidance authority for vocational and administrative work at the institute. How is it to be guaranteed that institute director decision making and guidance is not in error? This problem has been a prominent one. A manager, due to intellectual and other limitations, will always have weak points, and the institute director of a research institute is going to be the same. Therefore, to guarantee the accuracy of institute director decision making, democracy and science will have to be brought to that decision making, and decision-making organizational forms corresponding to the institute director responsibility system will be established. For the benefit of the institute director's decision making process, full use should be made of democracy, the pooling of many intellects, and multilateral demonstration and proof to lay the foundation for correct decision making.

Many research organizations that have implemented institute director responsibility systems have established institute affairs conferences and institute director administration meetings systems (also called the joint

meeting of persons of primary responsibility in the institute), and although the names of these meetings are not the same, their functions and uses are primarily similar. These meetings carry on broad discussions of decision making regarding major affairs and administrative problems in the institute. They offer advice and recommendations, lay the foundation for correct decision making and planning and for the particular implementation of decision making, which allows the continual improvement of decision making and its adaptation to real conditions. But these meetings are certainly not first-line decision making structures. They are organizations only to help the institute director make the correct selections and decisions, and the final decisions will still be made by and be the responsibility of the institute director. If the director were only to carry out the decisions made by these meetings, the institute director responsibility system would change into an institute director responsibility system under these conferences.

IV. Carrying out the institute director responsibility system and enhancing democratic management

The principles of democratic centralism and the mass line are the principles of activity for national organizations and national working personnel, and which must be followed by all state organizations and state working personnel. After implementing the institute director responsibility systems, science research organizations must continue to hold with these two principles. Of this there can be no doubt. Strengthening the democratic management of science research structures is simply a manifestation of the upholding of these two principles.

There is certainly no contradiction between the implementation of an institute director responsibility system and an enhancement of democratic management. This is because our research organizations are institutions that are socialist and public owned, and the institute director is the representative of management authority as authorized by the state and by the staff throughout the institute. The institute director must be responsible to the state and to staff throughout the institute, and the institute staff has the right to voice its opinions about decisions within the institute in order to ensure that national and state interests are not lost. Actually, for the losses created by a mistaken decision, the individual cannot be presumed responsible, for even if the individual has administratively or legally assumed a certain amount of responsibility, that is still limited, and in this aspect we have had quite painful lessons. Strengthening the democratic management of the institutes is certainly not to bind or restrict the authority of the institute director, but is a positive aid and condition by which the institute director can better carry out his job. Facts have shown that when democratic management is done well, decision making by the director is invariably in the people's interests, there are few errors, and execution is smooth.

The form of democratic management structures for science research organizations differs with different conditions. Generally speaking, the forms of democratic management in the scholastic management of institutes is the scholastic committee (technical committee), and for administrative management of the institute, there are the staff democratic management organizations (i.e., staff associations or trade union delegations).

Scholastic committees (technical committees) should be scholastic advising and planning organizations as the director exercises his authority. The institute director should make full use of their active roles in aspects like the promotion of scholastic research, scholastic exchanges between organizations, topic appraisal, achievement examination and approval, professional posts evaluation, and problems with major tasks within an institution, and provide them with full opportunities to speak out. Naturally, the advice and suggestions provided and decisions made by scholastic committees should be manifest through the decision making of the institute director, not placed over and above the director's decisions. For enhancing the democratic management of the staff, there are generally two methods: one is where many research organizations have established staff congresses, and the other is where the function of the trade unions is strengthened, allowing them the function of staff congresses. The primary functions of these two staff democratic management organizations should be seen as: being concerned with and deliberating on major decision making within the institute, monitoring and examining the cadre, protecting the legal rights of the staff, and supporting the proper guidance of the institute director.

The gist of what has been written above is that at the same time as we concentrate administrative and vocational guidance authority and management authority, we should also fully allow scientific and technical personnel and other staff workers to exercise their own democratic rights, by which the enthusiasm of scientists and technicians at large can be further aroused, and by which we can allow the institutes to make positive contributions to national science and technology endeavors.

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CSO: 4008/2030

NATIONAL DEVELOPMENTS

SUCCESSES OF NONGOVERNMENT SCIENCE GROUPS DISCUSSED

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 5 Dec 86 p 2

[Report by Wang Jianhua [3769 1696 5473]: "The Characteristics and Functions of Civilian-Run S&T Organizations"]

[Text] In this country, traditional science and technology organizations are nationally owned, the so-called "government-operations." "Civilian-run" is in contrast to "government-run." Actually, civilian-run science and technology organizations are a kind of idiomatic reference by people to science and technology structures that are not nationally owned. "Civilian-run" is in distinction to "government-run" primarily in not needing state funding nor state administrative formulations; funding sources are up to the organization; personnel organization is largely voluntarily constituted. In any sense, "civilian-run" is a new form of system, and is a new type of economic entity that closely integrates science and technology with the economy.

According to incomplete statistics, there are nearly 10,000 civilian-run science and technology structures throughout the country. The majority of these seek a living and development from society by relying on their own strength. They pay attention to making the best of what they have, forming their own characteristics. These are for the most part: getting rid of the traditional concept where science and technology eat from the "great rice bowl" of the state, they deal with self-acquired funds, assume sole responsibility for their profits and losses, independently operate on their own initiative, are independently accountable, and where the success of the operation is closely linked to the rights of the science and technology personnel; there are not limitations and restrictions due to barriers, and they have overcome the abuses in which science and technology are divorced from production, they rely upon market information, adopt responsibility systems in which they establish their own topics, that are freely organized, self-supported, and for which they solicit customers, all of which constitutes "a connected sequence" of research--production--marketing--service; scale is small, the structures are flexible, they are quite able to meet emergencies, and can both maintain a dominant position in technical advances and also promptly respond to changes in the marketplace; there are few levels of internal management, most have implemented two-level responsibility systems under an economic and a project group leader, respectively, responsibilities and authorities are clearly differentiated, there is rapid decision making,

and they have avoided the abuses of multiple hierarchies and complex procedures of the national units; they have broken through the state in which intellect is closed off and which has been created by ownership by departments, they have strengthened lateral relations, and promoted the movement of talent and intellect; in terms of distribution, they have implemented the practice of compensation for labor, abolishing the allocation manner of egalitarianism.

Although civilian-run science and technology organizations have not been in existence for long, they have served in the areas regarding the promotion of scientific and technical advances, the exploitation of talent, the acceleration of the transformation of science and technology into production forces as quickly as possible, and the invigoration of urban economies:

First, they have benefited the transfer and movement of scientific and technical achievements, have invigorated the technology markets, and have accelerated the development of rising new industries and town and township enterprises. In the past, because of abuses in the old system, channels were blocked for the transformation of scientific and technical achievements into the production sector, there were too many links in the turnover of an item, and there was a lack of information exchange and feedback. Civilian-run science and technology organizations have broadly opened various channels for technology circulation, which has allowed technologies to flow from research departments, higher institutions, and large enterprises into small to medium enterprises and the countryside. Since its inception, the Nanjing Science and Technology Development Company has helped small to medium enterprises sign 540 contracts for scientific and technical cooperation, and has solved technical problems for more than 400 units. The world famous Zhongguan Village "computer street" in the Haidian District of Beijing has been largely built up from civilian-run science and technology organizations, and this has come to assume an extremely important position in the microcomputer technology market in this country. As for example the M-2024 Chinese-English electronic printer developed by the Beijing Sitong Company, which supercedes the Japanese Toshiba TH-3070, for every one of which \$400 in foreign exchange can be saved. This technology has already saved this country \$12 million. According to 1985 statistics from pertinent units, civilian-run science and technology organizations in the Haidian District have paid 120 million yuan in profits taxes, which is one-twelfth the gross value for industry and agriculture for the whole district. It has been especially true over the past several years that we have intended to get involved with blocs of rising new industries in this country (or blocs of high technology industries), and due to the role of the civilian-run science and technology organizations, a bloc of these new technical industries is just now being formed in the Zhongguan Village area.

Second, they have broken out of the pool of stagnant water that stems from ownership by personnel departments in the old system, which has accelerated the rational movement of intellect and talent. Because of the abuses in the current personnel management system that are "one, uniformity, two, death, and three, a sealing up," there has remained a "drop out" between an overstocking of personnel and a deficiency thereof. If there is a "drop out," they should be able to move around. With the appearance of the civilian-run science and technology organizations, a new path has been opened for the movement of

personnel and intellect. According to Dalian statistics in regard to 96 civilian-run science and technology organizations, 2,058 people are directly involved in the work of these organizations. Of these, 1,060 are mid-level and higher scientists and technicians, which is 51.5 percent of the total. 2,251 scientists and technicians are concurrently employed or have accepted employment, among whom 1,752 are middle level and higher scientists and technicians, or 77.83 percent.

Three, we have trained a group of entrepreneurs and management personnel who are technical, capable, operations knowledgeable, and management knowledgeable. The speed of the economic and scientific and technical developments in our country has been slow, the primary reason for which has not been a lack of scientists, but has been a lack of management personnel who have an understanding of technology, an ability, and a knowledge of operations. This kind of talent is hard to train by relying only upon the higher institutions, and depends mostly upon forging through actual experience. A group of this kind of talent has appeared in the civilian-run science and technology organizations. They are shrewd and capable, full of spirit of sacrifice and exploration, have heads for economics, methods of leadership, and are personnel that are hard to find. For example, several ordinary engineers from the Chinese Academy of Sciences left their original units to run the Jinghai Computer Development Company, and this company quickly developed a science research enterprise with an annual production value of several tens of millions of yuan. A self-educated youth successfully developed for a civilian-run technology development company in Shanghai a Chinese character input method that is of an advanced international standard, and which has found favor with computer authorities in the United States and Japan. In this new world of civilian-run science and technology organizations there will be trained and employed on behalf of this country a large group of completely new talent.

Fourth, they have made good on omissions and deficiencies in our national science and technology organizations. In this country, the science and technology that is required in national economic construction is hierarchical and many-sided. However, for many scientific and technical achievements nationally-owned science research organizations have paid no attention to developmental research, and many practical technologies that have not attracted attention in production have had too few inquiries. Civilian-run science and technology organizations have undertaken developmental research on some technical problems urgent resolution of which is needed for production, and they have generated very good results in developing various technical services based on their own specialties and scope of operations.

These characteristics and functions that we have just described are manifesting the results of one aspect of the restructuring of the science and technology system. But these characteristics and functions are not completely possessed by the majority of national science and technology organizations currently in this country, for this provides a beneficial model and revelation for future further restructuring of the majority of national science institutes.

Naturally, as a new organism the civilian-run science and technology organizations will require a process of empirical exploration and perfection. At present, there are still many problems with the civilian-run science and technology organizations. Besides policy problems, some have involved the signboards of science and technology, where there has been engagement in purely commercial and purely production business without any research or development at all; although some appeared in the form of civilian-run firms, in actuality they were small workshops of national units; the operational scope of some is too broad, and they have no special characteristics of their own; the internal management and finances of some organizations is in confusion, and lacks a strict management system; and there have also been some problems concerning the violation of technology rights of the originating units. Attention should be paid to these problems and they should be appropriately resolved. But the existence of these problems should not affect the main course of the civilian-run science and technology organizations.

Regarding existing independent science research organizations in this country, aside from science research organizations such as the Chinese Academy of Sciences, the Academy of Social Sciences, and the Academy of Agricultural Sciences, the majority are under the leadership of ministries and commissions and of provinces or cities. Their source of funds and research topic tasking is passed on from departments responsible for the work. Cadre and science and technology personnel are allocated by the departments responsible for the work, and the achievements are returned to the responsible departments for use. More than 30 years of experience has shown that this sort of system is more prone to abuse than to profit, the greatest abuses of which are: on the one hand to cause the scattering of the limited scientific and technical powers of this country, repetition at a low level of science research projects, an inability to come up with key items, and an inability to closely integrate scientific research with production and trade; on the other hand, it has allowed the majority of science research organizations to rely on the responsible departments and eat from "the great rice bowl," has allowed the formation of a stagnant pool, lack of competitive ability, and poor results from science research. To resolve these abuses and to continue with the "Resolution by the Central Committee Regarding the Restructuring of the Science and Technology System," the State Council has successively issued restructuring regulations such as the "Resolution Regarding the Expansion of Institute Autonomy" and the "Provisional Resolution Regarding the Management of Science and Technology Allocations." These regulations have had an unquestionable major effect on enhancing the vitality of national science and technology organizations, on promoting the catering of research units to economic construction, close relations with production units and technology trade units, and are policies and economic measures that are quite powerful. However, because problems with department ownership have not yet been resolved, these reform measures would have various sorts of difficulties in actual execution.

In view of these conditions, we want to keep up with the "expansion of autonomy" and the reforms of the allocation system in a stable way, and to be successful with them, yet, we cannot help but learn from the experience of the civilian-run science and technology organizations and divorce the majority of independent national science institutes from their responsible units to bring

a true independence into effect; and also, after true independence they will rely upon market information, establish their own topics, operate on their own, and find their own customers; the sources for research expenses and operating expenses will change from primary dependence upon state allocations to primary funding by bank loans and enterprise investment. In this way, we will compel these institutes to take the initiative regarding adapting to the needs of economic construction, to take the initiative regarding orienting to large, medium, and small enterprises and to flourishing town and township enterprises, and to take the initiative regarding the opening up of technology markets, thereby obtaining their own capacities for development and reproduction. It is my belief that this course should become the direction for the restructuring of the majority of national science and technology organizations.

This course is one that may be used.

First, we already have the experiences of civilian-run science and technology organizations. Their experiences have shown that applied and developmental science research may be completely the type where the economic units are involved with self-acquired funds, where they are responsible for their own profits and losses, where they operate on their own, and where they are independently accounted, operating in accordance with economic rules and regulations. If applications and development are not undertaken from an economic point of view, then this kind of research will have no goal, is liable to be divorced from production, and should be allowed by society to fall into disuse.

Second, we already have abundant foreign experiences. From the point of view of Japan, the government only assumes 25 percent of the responsibility for research funding, the major part of which is used for the support of major projects, while 75 percent of funding must be by enterprise investment. Research expenses for Western countries are largely drawn from investment by the enterprise. In the past, the Soviet Union has had government funding for the most part, which is now beginning to be restructured. This foreign experience still shows that for science research organizations for which the government is responsible the communal rice bowl problem is similarly serious, nor are their economic results high. We should take these experiences from abroad into consideration.

We currently live in a competitive world, and only by competition can we advance. This bringing about of independence creates the conditions for competition.

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CSO: 4008/2030

NATIONAL DEVELOPMENTS

TRANSFER OF SCIENCE WORKERS TO SMALL ENTERPRISES DISCUSSED

Beijing GUANGMING RIBAO in Chinese 22 Nov 86 p 1

[Text] During the restructuring, it would be very gratifying if even more intellectuals were to leave the imposing dwellings and spacious courtyards to go to towns and villages to contract to small enterprises.

Small enterprises are over 90 percent of the total number of enterprises in this country, and their output is nearly half the total value of industrial output. It may be said that small enterprises are the most vigorous and most vital segment of the economy, and they will be of strategic significance in future economic development. Consequently, although there are many small enterprises at present, their technical levels are low and management is especially backward. One major reason for this is a deficiency in skilled personnel. We have at hand the data from two surveys in which are discussed the Erqing system in Nanning, Guangxi, which unexpectedly has no technical personnel, not to mention engineers; and that among small factories of a certain industrial bureau in Tianjin there is not a single technical person in 43 factories. In contrast to this, in some large enterprises and science research units, there is a serious overstock of skilled personnel. In recent years, science and technology personnel have been working at two or more jobs, the results of which have been good, and this should be maintained; but this is not enough, we must go a step further, that is, to encourage scientists and technicians to go to small enterprises as factory directors and managers and to contract their services, which is an effective path to develop small enterprises. In this area, we already have experiences to look back on: in recent years, many scientists and technicians have gone to the countryside to foster township and town enterprises, and of township and town enterprises in the Jiangsu, Zhejiang, and Anhui area, there is not one that does not depend upon scientists and technicians from the large cities to keep in business. There is a phrase common in that area: "With the brains of Shanghai people, we will become rich." Going a step further on this basis, if we can change the intellectual support of scientists and technicians into direct intervention and direct operations, we could not only make science and technology transform into production forces as quickly as possible, but could also effectively resolve problems such as where the operations management of small enterprises is not good and methods of production are backward, which will bring vitality to small enterprises.

When science and technology personnel leave the office buildings to contract to small enterprises, they are facing up to a problem of getting rid of old concepts. There are comrades among us who still feel that in doing technical development and applications in serving the economy you would not be able to go to a luxurious office, and they even more look down upon scientists and technicians undertaking the running of enterprises, all of which feelings are prejudiced. In the history of our people, some people with insight in scientific circles, the likes of Zhan Tianyou [6124 1131 0147] and Hou Debang [0186 1795 2277], selected a route that led from scientist to industrialist. Others feel there is no future in working for small enterprises. History has shown that this is not accurate either. There are materials that show that small to medium enterprises in Japan, the United States, and West Germany are 90 percent and more of the total number of enterprises. Some small factories in this country have also produced first-line products for marketing both domestically and abroad. It may be said that in small enterprises scientific and technical personnel are not only in the forefront, but have a pleasant future. Naturally, losing the "iron rice bowl" to contract to a small factory is certain to involve risks; even so, in what reform can you take part without certain risks?

If we are to encourage science and technology personnel to contract to small enterprises, there must be particular measures. For example, the ownership by units of skilled personnel must be completely broken up, and there must be corresponding policies formulated regarding promotion, wages, and bonuses. In recent years, some areas have treated the gains by scientists and technicians through their labors as illegal income and confiscated it, and some units have unilaterally broken contracts, which has harmed the enthusiasm of scientists and technicians. These methods must be completely rectified. As long as work in all aspects is done well, the method by which scientists and technicians contract to small enterprises will become a practical step in the reforms. And it will infuse vitality into our economic construction.

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CSO: 4008/2041

NATIONAL DEVELOPMENTS

ENTERPRISE'S SUCCESSFUL APPLICATION OF TECHNOLOGY REPORTED

Beijing GUANGMING RIBAO in Chinese 5 Dec 86 p 1,4

[Report by Ma Yunong [7456 7183 6593]: "Observation Report on Changzhou 'Science Research Type Factories'"]

[Text] It has been said that people who believe in a god are certain to receive good retribution. Whether this is true or not, there is no proof. But in Changzhou City, this phrase has certainly been confirmed. However, the "god" here is nothing other than science and technology.

Many factory enterprises in Changzhou have raised science and technology to the status of a "god." They consciously sought help from science and technology in developing production, and have obtained accomplishments that are astonishing. The establishment of research-type factories is one of their outstanding pioneering works.

Science research-type factories--this new term that combines the two concepts of science research and factory production, has been proposed in Changzhou for more than 2 years. The activities regarding establishment of the research factories jointly sponsored by the Changzhou municipal science and technology commission and the economics commission have played an enormous promotional role in the development of factory enterprises. In early November, while this reporter was researching in Changzhou, public appraisal activities were just concluding for 1985, and prizes were about to be issued. Investigation of this question was just beginning by the municipal science and technology commission in charge of commendation meetings.

The chairman of the science and technology commission spoke of the devoutness of believing in this "god"

"The goal in developing this activity is to more effectively promote technological advances in enterprises and to allow science and technology to become the patron and wings of enterprise development." Municipal science and technology chairman Zhou Er [0719 3799] made clear to this reporter from the beginning, as he described the purpose of initiating this activity.

It is traditional that the Changzhou municipal factory enterprises respect the function of science and technology. In recent years, factory-run research

activities have become enlivened, more standardized, and some factories have continued to establish institutes and technology development departments, where the integration of science research with production has developed to an even higher level. Science research factories were born at just this historical moment.

"So just what is the meaning of science research-type factories?" asked this reporter.

Chairman Zhou Er, who had once done research for many years at the Institute of Applied Chemistry of the Chinese Academy of Sciences, laughed lightly and explained that there are different ways to look at this term, and it is not even completely correct. But its practical significance is clear, that is, it is founded upon the progress of science and technology, it treats a reliance upon and promotion of the development of science and technology as an important means by which to improve labor productivity and economic results, and it has been implemented in the factory enterprise, which is a unification of production and science research. More particularly, there are seven major conditions:

1. There must be highly efficient information and operations and research and development departments within factories, and there must be a complete process of research and development from market investigations to research and development to batch production to marketing services and finally advances and improvement.
2. Better conditions and capabilities for research, testing, and batch production. A relatively firm and constantly developing cooperative association with research units and higher institutions. Active use of "outside knowledge," the firm grasp of new information through various means, the importation and absorption of new technologies, and the development of new products.
3. A resolute leading group that respects science and technology, the constitution of which should be 70 percent or more scientists and technicians. Having a complete system for science operations management that will strive for the close integration of scientific and technical modernization with management modernization.
4. Complete respect for the improvement of the technical quality of the enterprise staff and for the knowledge renewal of technical personnel. Planned multi-format convening of cultural supplements, technical training, advanced training, and academic exchanges, as well as observation abroad. In the short term, the proportion of scientists and technicians in a staff should rise annually until it reaches 0.5 percent or more, and there should be an average increase of 0.25 grades through examination of the technical proficiency of workers.
5. Technical and economic quotas should be at the forefront among those of the same domestic industry, and factors for technical advancement are required to be 50 percent and more. Each year at least one product wins provincial or higher designation as a superior product.

6. Factory enterprises should guarantee retention of a prescribed proportion to be used in research, product development, and technology advancement. Each year (every 2 years for the machinery and electronics industries) one new product or more will be developed, and year-end equipment renewal and transformation coefficients should be 0.1 or higher.

7. There is truly workable long-range science and technology planning that is full scale, and that is used in guiding the development of particular enterprises.

Based on the conditions just described, factory enterprises participating in this initiative will undergo an appraisal each year, those qualified, passing, those not qualified, not passing, there will be a uniform checking and acceptance, and there will be no lifetime employment. These conditions not only make particular demands, but also have quantitative quotas, and the standards are quite strict. But for many enterprises in Changzhou, these kinds of demands are not too harsh, because they themselves have even higher goals.

One example: the "Gold Lion" somersaults 4 times in 5 years

The Changzhou Bicycle Head Factory recently won designation as a research factory for 1985. Persons in charge of this factory told this reporter that the Changzhou Bicycle Head Factory was only 10 years old, and if it could get the name of its product "Gold Lion" into the ranks of name-brands in the bicycle industry throughout the country, it could run neck and neck with "Yongjiu" and "Fenghuang," the basis for which would be scientific and technical superiority.

In 1979, 3 years since its founding, the "Gold Lion" factory had only reached the level of producing 60,000 bicycles a year. In the fiercely competitive bicycle industry, how would the "Gold Lion" survive and develop? The principles decided upon by the factory leadership after repeated study were: start domestically, be oriented to the world, and bring in advanced technology so that we can take off from a higher starting point. They organized their scientists and technicians in two directions, north and south, to visit other factories in the industry and related institutes and sources of information to understand the new techniques and new technologies in bicycle production both domestically and abroad, and to seek out and bring in alternatives.

In 1981, this factory formed a corporation with the China Export Commodities Base for joint operations of industrial trade. This created beneficial conditions for the importation of technology. In this year they brought together the technology transformation of the second period of the factory, importing all together 47 sets of advanced equipment from abroad. At that time, the technical capacity of the factory was still quite weak, with only some 30 technical personnel. On the one hand, they uncovered the internal potential, and the other hand broadly cooperated with science organizations and higher institutions outside the factory. They arranged technology problem solving, and greatly reduced the time for installation and debugging. As a result, that year they imported and placed into production, and the next year

the production structures of the factory were fundamentally changed. In 1982, production of the "Gold Lion" Bicycle Factory grew to 5 times that of 1979 to 310,000 bicycles, and the quality was all of a sudden among national A-level products. With accumulations over the year, the investments in importing equipment had been recovered.

These 2 years, the factory has placed its emphasis on strengthening its scientific and technical contingent and on the absorption of imported technology. They have broadly recruited skilled personnel, and have established a factory-run institute. The number of science and technology personnel throughout the factory has increased 10-fold in just a few short years, until it is now 300 people. They have actively established scientific and technical cooperative relations with science research organizations and higher institutions, and have taken the initiative in providing imported equipment as samples and in joint research, absorption, and innovation.

The oxy-propane multi-jet brazing technique used in the bicycle frame welding is at an advanced 1980's level. But the welding rods used by this advanced imported equipment also had to be imported from abroad. They motivated the scientists and technicians from this factory to cooperate with units from Nanjing University, Xian University, and the Shanghai Institute of Welding to quickly and successfully develop a product that could be used similarly. Now, of the more than 100 sets of advanced foreign equipment imported by this factory, nearly all have been absorbed and assimilated. The various new techniques will be gradually disseminated to form more than 30 production assembly lines for a preliminary modern production scale. Economic results for the factory have been even more remarkable, and over the past 2 years, the accumulations realized each year are approximately equal to the total value of investments by the factory, or, they could build one similar factory in one year. Last year, production reached 1 million, 8 times that of 5 years before, and this year it could reach 1.2 million. And now, the "Gold Lion" brand bicycle not only has a good reputation in the domestic marketplace, but it has also been well received in international markets to become one of the four largest brands among Chinese bicycles.

Another example: a small factory on its way to international recognition.

The Changzhou Pharmaceutical Plant No 4 has developed from a street enterprise to a small collectively owned factory. Over the last 3 years, output value and profits have increased 3 and 4.7 times, respectively. Per capita profitability and productivity for all workers are second and fourth, respectively, among pharmaceutical enterprises throughout the province. Last year, this plant was evaluated as an advanced enterprise for Jiangsu Province, and recently was designated as a Changzhou City science research factory for the second time.

How could it have developed so quickly? Plant director Xu Yuhai [6079 3768 3189] significantly gave this reporter the following data:

Of the 480 workers in the entire plant, at present 13 percent of those are technical personnel.

At the 28-person institute owned by the factory, they can put out a new product on the average of once per month.

In recent years, the plant has once received the award for scientific and technical achievement from the National Bureau of Pharmacy, twice the provincial award for scientific and technical achievements, 7 municipal awards for scientific and technical achievements, six of its products have filled domestic voids, and one product was awarded a silver medal for national high quality products.

Their secret of success has been in their belief in this "god," science and technology. Fourteen years ago, when this plant first began, it could only handle simple pharmaceutical packaging. In recent years, this plant has begun from improving the quality of technology to shifting the plant from a solely production operation onto the track of integrated research, production, and operations.

First of all, they regarded information as an important resource, establishing in the plant an information management section responsible for categorizing and filing information of various types, which revitalized operations for the plant director and pertinent departments and hastened the development of new products, and provided a scientific basis. On this basis, they did not spare heavy investment, and built a plant-run institute with 6 laboratories and an advanced development workshop. They undertook new product development, the absorption of imported technologies, and research on new techniques and applications. At the same time, they hastened their intellectual investment by running a 3-year term enterprise economic college course to correctly train technical key elements and management personnel. They have also linked up with 19 pharmaceutical colleges and science research units, have established regular cooperative relations, and have formed a research-production association with units from Tianjin University, Nanjing Pharmaceutical Academy, and Shanghai Pharmaceutical Research Institute to attract new research achievements. With their own real internal research and development power and a social scientific and technical cooperation, this plant has more than 50 products in operations each year, where one generation is in regular production, one generation is in batch production, another generation is a follow-up awaiting production, and another is scheduled to be developed, all of which has enabled the enterprise to maintain a long lasting vitality.

In March 1984, a delegation from the United States Academy of Sciences inspected this plant and fully praised their methods and accomplishments, and made a special invitation to the plant director Xu Yuhai to participate in the United States sponsored conference on science and technology policy in October of next year. Last year, Xu Yuhai kept his promise and went to America, and spoke at the conference of the experiences of the plant in relying upon science and technology to stimulate development of production. In June this year, this plant signed an agreement of joint operations with a West German (Ke lin ge) delegation, and they are currently seeking world-wide scientific and technical cooperation. On the day this reporter went to investigate at the plant, Plant Director Xu Yuhai was again readying his luggage for another visit. Three days later, he was to accompany the China Enterprise delegation to Yugoslavia to participate in a Sino-Yugoslavia economic trade fair. He

apologized again for his inability to talk in detail due to preparations. As we parted, this reporter unintentionally noticed that the products of this plant were covered with the word "Scientific" as a trademark. I asked what this could mean.

The plant director laughed and replied, "The development of this enterprise has primarily depended upon scientific and technical modernization!"

What valuable conviction! What valuable awareness! With this kind of courage and insight, these entrepreneurs will go out into the world from Changzhou.

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CSO: 4008/2041

NATIONAL DEVELOPMENTS

BEIJING TECHNOLOGY DATABASE USE REPORTED

Beijing BEIJING KEJIBAO in Chinese 28 Nov 86 p 1

[Article by Bie Qinghe [0446 3237 3109]: "To Stride Into the Information Society"]

[Text] We once reported in this newspaper on the completion of the "national scientific and technical achievement trading information database," and the news of its going into operation. What is it like to use this system? On 19 November, when the Beijing Municipal Science and Technology Commission and the municipal Academy of Science and Technology joined to evaluate this system, reporters interviewed pertinent officials, the impression from which is: this system is playing no small part in economic construction.

According to these persons, this database which was established by the Beijing Municipal Science and Technology Information Institute is, to this point in time, the largest database in this country for information on scientific and technical achievement trading. There are more than 23,000 scientific and technical achievements from more than 2,600 units entered in the database. It may be said that this database provides a bridge that allows science and technology to be quickly transformed into production forces, and is serving to advance things. Before Comrade Xu Ruzhen [6079 3067 4176] of the Xumiao Mirror Processing Plant of Danlou Village in Feng County, Jiangsu Province, came to the database, he had been commissioned by four specialist households, who hoped to buy a technology that would form picture frames out of sawdust. A minute later this system had provided accurate information through retrieval: the Jilin Province Science and Technology Development Center was selling this kind of technology. Both parties negotiated and quickly signed a 1,400 yuan contract for the transfer of the technology.

The Hebei Province Automation Institute wanted to investigate and study the situation regarding microcomputer applications, the expenses for which topic were set at 30,000 yuan. When they saw in the newspaper the news that this database had been established in Beijing, they gave up the idea of sending someone all over the country to research this. After coming to Beijing, they quickly found more than 900 related pieces of the information they needed. Their fee was only 90 yuan.

Through retrieval, the Handan Rubber Factory No 2 found 200 new technologies regarding rubber that they wanted to know more about;

The Xuanhua Paper Plant found 20 technologies for microcomputer applications in paper making;

The People's Hospital of Changde County in Hunan found information relating to medical computing;

The Beijing Railway branch office found dozens of technologies regarding "three wastes" management and boiler control.

There was in the past the situation whereby there was repetitive research on the same topic; the situation where scientific and technical achievements were hidden away; and that situation in which a science research department suffered from having no one who knew of scientific and technical achievements all of which have been gotten rid of through this database.

Leaders and specialists in relevant aspects believe that this system is successful, that it has made its own mark in the science and technology information system of this country, that it is an attempt at developing a factual database that has use value, and at the same time is a new path through which to undertake lateral associations and develop nationwide cooperation.

If we speak more generally of the function of this system, we may reach the following conclusions: it has opened information channels for the trade of technology achievements; it has provided information that is necessary for science research units and scientists and technicians to engage in science research; it has provided information of reference value for production and usage units to understand new technologies and improve and advance product quality; it has found avenues of marketing for some products; it has provided information resources for some consulting organizations.

Comrades from the municipal Science Research Institute and the municipal Information Institute told reporters that they are currently improving this database to better meet the demands of the information society.

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CSO: 4008/2034

NATIONAL DEVELOPMENTS

BEIJING RESEARCH, PRODUCTION COOPERATION REPORTED

Beijing BEIJING KEJIBAO in Chinese 28 Nov 86 p 1

[Article by Chen Zhiqiang [7115 1807 1730]: "Rely Upon the Advantages of Science and Technology in the Capital to Hasten Product Updating and Upgrading"]

[Text] The industrial system of this city focuses its reliance on the technical strength of higher institutions and of science research units to develop lateral associations and scientific and technical cooperation, and to hasten the pace of product updating and upgrading.

Beginning this year, the municipal economics commission has considered the development of lateral science research--production associations, the development of scientific and technical cooperation, and the development of new products as important work to be taken charge of. Concerned leading comrades in the municipal economics commission are leading the contingent in organizing senior engineers and heads of science and technology offices of every industry and corporation to science research units and college campuses at Institute No 625, Institute No 621, the Computing Institute of the Chinese Academy of Sciences, Beijing College of Engineering, and Qinghua University to learn, to understand conditions, and to strengthen relations. They are arranging for colleges, institutions, and science research units to go to factories and enterprises to evaluate major products such as pianos, refrigerators, and washing machines to attack the problems of quality for major products and contribute plans and designs for the upgrading of products. They have obtained gratifying achievements in their joint development of new products. The Beijing Electrical Processing Machine Tool Plant and Institute No 303 of the Ministry of Aeronautics have developed their scientific and technical cooperation, and taking in the scientific and technical achievements of Institute No 303, they were the first in the nation to develop a superthick machine tool for handling 400 mm electrospark wire-electrode cutting, which filled a void in this country. Cooperation between the Beijing Freezing Equipment Plant and Qinghua University developed the first microprocessor controlled air conditioning unit in this country, the technical level of which is of the international level of the late 1970's or early 1980's. This has allowed air conditioning and cooling equipment to take a gratifying step toward a unification of electro-mechanics. The Huaguang Electrical Appliance Plant, in the Haidian district, and Qinghua University cooperated to develop

successfully a low temperature sintered monazite piezoelectric ceramic transformer. This is a low current, high voltage new type of transformer with the merits of high piezoelectricity, low driving voltage, automatic cut-off without burning out when loads short circuit, small size, and light weight, which has filled a void in this country. The Beijing Standard Parts & Machinery Repair Plant and the Institute of Casting and Forging of the Ministry of the Machine Building Industry formed a research--production association to jointly develop specialized equipment for various standard parts. This year they successfully developed the first large-tonnage 200 ton multi-tasking bolt cold forging machine, which satisfied an urgent need in close tolerance parts production.

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CSO: 4008/203⁴

NATIONAL DEVELOPMENTS

COMMENTARY ON SUCCESS OF CHANGZHOU BICYCLE FACTORY

Beijing GUANGMING RIBAO in Chinese 5 Dec 86 p 1

[Commentary by staff commentator: "Taking the Path of Unifying Research, Production, and Operations"]

[Text] Science and technology are seriously divorced from production, a most prominent malady created by the feudal science and technology system of this country's past. After restructuring the science and technology system for over a year now, this problem has had a preliminary change. However, the situation in which science and technology are divorced from production has not been fundamentally turned around. On the one hand, the techniques of many factories and enterprises are backward and the products are obsolete, and we still lack the motivation to seek technological advances; in another sense, some science research organizations locked away in high buildings or deep courtyards have still not opened up to factories and enterprises or to the outside world, nor have they established interdependent life or death relations with the national economy. This kind of situation has seriously obstructed the development of social production forces and has drawn out the progress of our modernization. To this end, exploring and changing the road to this situation is a severe problem that lies before us.

Is there any way? The Changzhou "research factories" introduced in this issue, together with the reform practice of the Changzhou Institute of Chemical Engineering reported earlier, provide satisfying responses to this. This, then, is the path toward the unification of research, production, and operations. Here, factories and enterprises are self-consciously relying on scientific and technical advances to improve and develop new products and the capacity for economic results. And through various kinds of associations with factories and enterprises, institutes have become economic entities seeking their own rapid development. From these two different directions, they have taken the same path for promoting the close integration of science and technology with production, truly manifesting an orientation to economic construction by science and technology, and the principle of economic construction relying on science and technology.

We can see from the experience of Changzhou that taking the path of unifying science and technology, production, and operations has at least the following advantages: one is that it benefits the technical development and renewal of

the technology of factories and enterprises. The "Gold Lion" product of the Changzhou Bicycle Head Factory, which had only a 10-year history, could have a reputation domestically and abroad by relying upon the superiorities of science and technology; while the Changzhou Pharmaceutical Plant No 4 could go in one jump from a small street factory to the front ranks of its peers in this province, its secret being primarily that this plant has a 28-person institute that can produce a new product on the average of every month. Second, it benefits the promotion of scientists and technicians moving toward the enterprises, and allows their valuable labor capacities to be transformed into achievements beneficial to society the most quickly. Three, it is beneficial to improving the income and remuneration for scientists and technicians, intensifying the relations between intellectuals and the working public. The function of scientists and technicians has been fully realized in the factories and enterprises, and the working public has seen the value of knowledge and of intellectuals more clearly. The spirit that respects knowledge and intellectuals can naturally be easily disseminated and widened.

For science and technology to have exercised this great a force in Changzhou, this experience is worth the reflection and consideration of comrades in all areas. We can see from the experience of Changzhou a brand new direction for Chinese science and technology and for enterprise development, and their prospects are extremely attractive.

12586
CSO: 4008/2041

NATIONAL DEVELOPMENTS

DALIAN'S IMPORTATION OF TECHNOLOGY DISCUSSED

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 18 Dec 86 p 3

[Text] The city of Dalian has adopted a series of measures that in policy and structure motivate the enthusiasm of enterprises and strengthen the management and absorption of imported technologies, the results of which have been outstanding.

In the early part of this year, Dalian determined 70 absorption and assimilation projects. Under the leadership of the municipal government, they convened departments of the planning commission, economics commission, financial administration, banking, tax revenue, pricing, goods and materials, and water and electricity to do investigative research on the major projects, requiring that the problems to be solved "sit in the right seat," that whoever they involve will use particular policies to resolve them as quickly as possible. The problems regarding foreign exchange, funding, complementary parts factories, cooperative factories, tax revenue, and pricing for these 70 major projects in absorption and assimilation were quickly and fundamentally dealt with. The Dalian government also formulated some policies that motivate the enthusiasm of enterprises for absorbing and assimilating technology and nationalizing it.

By getting rid of created barriers, Dalian has implemented lateral associations to promote the nationalization of technology. They have primarily adopted three modes: one, "marriages of enterprises," which realizes the nationalization of assorted parts and raw materials in step with the main engine. Second, is "a continuous process of coordinated problem solving." Third, is where factories import and the institutes absorb and assimilate. The two-link non-oxidizing furnace imported by the Dalian Wrist Watch Plant is watch-specific equipment needed throughout this country, but the watch plant has no capacity for its absorption and assimilation, so the city government treated this topic as research tasking, which it then allocated to the Dalian Institute of Metal Chemistry. Presently, the nationalization of this technology has reached 95 percent, and there are innovations in the driver and control systems over imported equipment. By adopting the measures above, as of now, of the 310 importation projects now complete and in production throughout the city, 176 have been absorbed and assimilated to some degree.

12586
CSO: 4008/2041

NATIONAL DEVELOPMENTS

TIANJIN SCIENTIFIC ACHIEVEMENTS NOTED

Beijing BEIJING RIBAO OVERSEAS EDITION in Chinese 13 Dec 86 p 4

[Report by Cong Wenzi [0654 2429 3320]: "This Year, Tianjin Obtained More Than 300 Major Achievements"]

[Text] Tianjin, 12 Dec (XINHUA)--Reporters learned from the Tianjin Municipal Science and Technology Commission that this year Tianjin obtained 319 major scientific and technical research achievements, 4 of which are among international pioneers, 27 are at an internationally advanced level, and 132 of which are among Chinese domestic pioneers.

Ms Cheng Minghua [4453 2494 5478], in charge of the Tianjin Science and Technology Commission Achievements Office, told reporters that the majority of these achievements have been disseminated and applied, while a minority are still undergoing trial production.

She explained that the 4 Tianjin scientific and technical achievements ranked as international pioneers were: a nickel-titanium marmem, a memory twin-leaf dual/single artificial body joint; towel fabric loosely guided drying machinery; using foot bone-fixed boots to synthetically treat foot bone joint fractures; manufacturing rock wool from liquid slag.

Successful development of the artificial body joint opens a new path for not using bone cement to resolve artificial body joint fixedness. There have been 5 operations that have been successful using this new type of artificial body joint.

The new type of drying machinery will allow fabric to not come in contact with high temperature metal rollers, which will improve product quality; the foot bone-fixed boot treatment for foot bone fractures can reduce the healing period by one-third, and consequences have been clearly reduced.

According to her explanation, in recent years Tianjin has undertaken a series of reforms for the science and technology system, and all the science research topics in this city are done under a contract responsibility system. The rights, obligations, expenses, and methods of reward and punishment for each party to these science research contracts are clearly provided in writing.

12586
CSO: 4008/2034

PHYSICAL SCIENCES

STUDY OF MICROPLASTIC DEFORMATION OF METALLIC MATERIALS

Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY]
in Chinese Vol 16 No 6, 20 Nov 86 pp 20-27

[English abstract of article by Zhang Lining [1728 0500 1337] of the
Department of Materials Science and Engineering, Nanjing Institute of
Technology]

[Text] The significance of microplastic deformation in relation to the mechanical behavior of metal components is discussed. The experiment on specimens of 20Cr, 40Cr and 60Si2Mn shows that the resistance to microplastic deformation is affected by both microstructure and residual stress involved in specimens. There exists a close relationship between microplastic deformation and residual stress. From this point of view, the author presents a model to explain the negative residual strain phenomenon. The variation of microplastic deformation during cyclic loading is tested with different peak stresses and the results are compared to the regularities of residual stress relaxation in fatigue. (Paper received 14 Dec 85.)

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DIGITAL SIMULATION MODEL OF MACHINE-NETWORK TRANSIENTS IN POWER SYSTEMS--
WHOLE SYSTEM STATE-SPACE EQUATION MODEL

Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY]
in Chinese Vol 16 No 6, 20 Nov 86 pp 73-86

[English abstract of article by Chen Heng [7115 3801] and Li Naihu [2621 0035
3275] of the Department of Electrical Engineering, Nanjing Institute of
Technology]

[Text] A new mathematical model--the state-space equation model for simulating
the machine-network transients in power systems--is proposed. In this model,
an $\alpha\beta0$ system is used as the reference frame for power network equations;
"Multiple Pi" equivalent circuits are used for transmission line modelling;
in addition, the machine-network interfaces specifically suitable for "de-
coupled" solutions for turbo-generators, composite loads and power network
state equations are adopted. Therefore, it has the advantages of simplicity,
accuracy, flexibility, and also fewer requests for memory. Moreover, if
a suitable algorithm is used with it, the simulation speed is also satisfactory.
(Paper received 25 Jun 85.)

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CALCULATION OF COAL FIRED PRODUCT COMPOSITION AND MEASURES FOR SPEEDING UP CONVERGENCE IN SOLVING NONLINEAR EQUATIONS

Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese Vol 16 No 6, 20 Nov 86 pp 95-103

[English abstract of article by Lu Fan [7120 1581] and Fang Yilin [2455 0001 7792] of the Thermoenergy Engineering Research Institute]

[Text] Since the order of various components of coal fired products is different from each other to a great extent, the convergent speed using the steepest descent and Newton's method directly will be very slow. It is a computer time consuming job and divergent if the initial values of the product composition are not rationally selected. In order to solve this problem, this paper improves the selection of variables and objective functions. It enhances the convergent speed and calculation accuracy and decreases the iteration from about one hundred times to less than ten times, which shortens the computer time consumption to a great extent. In addition, accurate initial value selection is no longer required. (Paper received 10 Jan 86.)

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DEVELOPMENT OF 3-BCD MILLIVOLT A/D CONVERTER WITH 40-CHANNEL MULTIPLEXER

Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY]
in Chinese Vol 16 No 6, 20 Nov 86 pp 139-144

[English abstract of article by Lu Youchang [0712 0645 2490] and Wan Caichun
[8001 2088 2504] of the Research Institute of Thermoenergy Engineering]

[Text] A 3-BCD millivolt A/D converter with 40-channel multiplexer is introduced. It is applicable to A/D conversion of low analog signals produced by many first elements, e.g., temperature transducer or pressure transducer, etc. In order to improve the system accuracy, the paper analyzes the effects of parameters of the millivolt amplifier and provides a method for auto-adjusting the zero drift of the amplifier. This converter is applied to the microprocessor monitor system of L3.5-20/8-1 air press. In this system the data logging rate is about 24 points per second, and the accuracy of the A/D converter is higher than 0.2 percent. (Paper received 4 Dec 85.)

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9717
CSO: 4009/1053

APPLIED SCIENCES

INDUSTRIAL CONTROL MICROCOMPUTER SYSTEM DESCRIBED

Beijing DIANZI JISHU YINGYONG [ELECTRONICS APPLICATIONS] in Chinese No 5,
25 May 86 pp 7-10

[Article by Xu Danian [1776 1129 1628], Wang Gang [3769 6921], Wang Qiang
[3769 1730], and Qi Gengchun [7871 1649 2504], Beijing Computer Fittings
Plant No 5: "General Process Controller FY-1 Industrial Measurement and
Control Microcomputer System"]

[Text] This system is based on the S-100 standard expansion chassis, and
is an industrial measurement and control system using OEM type modular card
construction.

I. System Functions and Structure

1. Introduction to functions

The FY-1 system uses a single board computer made up of the 8-bit microprocessor Z80 CPU to carry out arithmetic and processing functions, and has from 16K to 64K bytes of memory. For on-site connections, this system is fitted with process input channels and process output channels that are very powerful in function. This system also has a signal scale conversion feature, allowing the range of system signal processing states to reach 55 db ($19 \mu V \sim 10V$), which can widely adapt to the collection of various physical parameters in the field. Based on different conditions and different requirements for the controlling fields, this system provides non-buffered input/output channel and buffered input/output channel function modules.

The FY-1 system can be connected to various printers and plotters having Centronics standard interfaces, for data recording, listing, and drafting. It can also display graphics or data on CRT terminals. It can communicate with various kinds of microcomputers through serial data interfaces. In view of the characteristics regarding domestic applications computers, this system is fitted with a bus conversion interface to accommodate various types of microcomputers. For example, microcomputers constructed with the 6502, 6800, 8088, and 8086 processors.

The software with which this system may presently be configured include monitor programs, real-time management programs, BASIC, Z80 assembler, disassembler, trace and debugger programs, plotting software packages, and data collection and processing software packages.

2. System constituents and structure

Figure 1 is a schematic of the system hardware structure. In actual applications, the system CPU module board, the various analog quantity module boards for input/output channels, switching quantity module boards, and digital quantity module boards are chosen in accordance with various different needs.

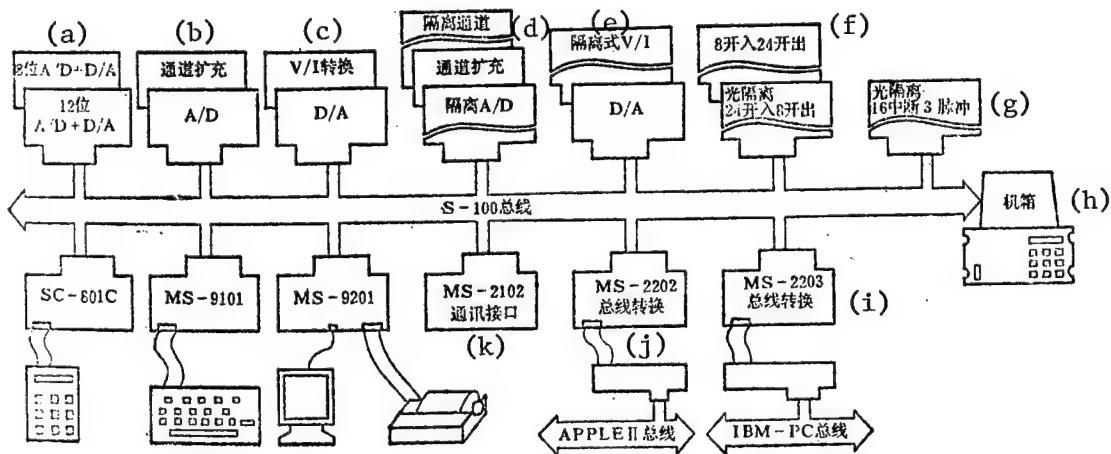


Figure 1. FY-1 System Structure Schematic

Key:

- a. 8-bit A/D & D/A; 12-bit A/D & D/A
- b. Channel expansion
- c. V/I converter
- d. Buffered channel; channel expansion; buffered A/D
- e. Buffered V/I
- f. 8 switched input, 24 switched output; optoisolated 24 switched input, 8 switched output
- g. Optoisolated 16 interrupts, 3 pulse
- h. Computer case
- i. MS-2203 bus converter; IBM PC bus
- j. MS-2202 bus converter; Apple II bus
- k. MS-2102 communications interface

For the various module boards with which the system is currently configured, please see the last two pages of this article.

II. The System Working Modes

1. A brief description of the host module boards SC-801C, MS-9101, MS-9201

The host module board portion of the FY-1 system is composed of the two boards that are the CPU board and the function expansion board, both of which use S-100 bus cards, and are the control kernel for the entire FY-1 system. To meet the demands of different industrial fields, we have designed two CPU boards, the SC-801C and the MS-9101. The former is compatible with the domestic TP-801B in general use; the latter is provided with stronger real-time functions, suitable for high level languages. Both models of CPU boards have keyboards separate from the host. The SC-801C has a small keyboard, while the MS-9101 has a large keyboard.

The two CPU boards, when fitted with the MS-9201 function expansion board, can expand their internal storage capacity to 64K. When connected to CRTs, there can be interactive screen plotting, and printers and plotters can also be fitted. Figure 2 is a block diagram of the SC-801C CPU board.

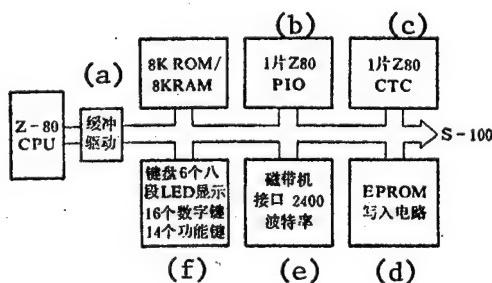


Figure 2. SC-801C CPU Board Block Diagram

Key:

- a. Buffer driver
- b. One Z80 P10
- c. One Z80 CTC
- d. EPROM write circuit
- e. Tape interface at 2400 baud
- f. Keyboard, 6 8-segment LED display, 16 digit keys, 14 function keys

The SC-801C CPU board has the ability to develop on its own, being both the control core of the system and something that can also run independently as an inexpensive single-board computer. It is supplied with the management software TPBUG or MSBUG. TPBUG supports machine language user programs, while MSBUG supports user programs at the assembly language level. Under the control of MSBUG, we can interact with the CRT for assembly and disassembly.

The CPU board controls the various module boards for input/output channels through its I/O operations, where as soon as any module board enters the system, there is a fixed port address, and the CPU commands the activities of each module board on a time-sharing basis under program control.

When used in industrial environments and for laboratory measurements and control, microcomputers (including single board computers) have two difficulties that need to be resolved: one is that the writing of real-time multitasking application programs is both difficult and time consuming. A second is that when operating in the field, strong electrical interference can often crash programs and data.

The MS-9101 CPU board focuses on the resolution of these two problems. It first of all forms a high level dual board computer of general significance or an inexpensive system computer out of the MS-9101 and the companion MS-9201. The CPU is a Z80A running at 4 MHz, ROM and SRAM can be to 64K, it can be fitted with ordinary printers, the CRT can be either character or graphics mode, the ASCII keyboard is suitable for entering high level languages, and an automatic start and stop fast magnetic tape recorder can be used for external storage.

In addition, the MS-9101 board has the preferred functions that are popular in the marketplace but that personal computers and single board computers do not have.

To allow users to be able to conveniently write monitoring, control, arithmetical, processing fault, printer, display, communications, and interactive system programs, we have provided to the greatest extent possible a real time hardware environment, where for example the keyboard and printer use interrupts; the magnetic tape recorder operates in a programmed start-stop mode; the board has an non-volatile calendar clock with which interrupts may be set in seconds, minutes, and hours; the system clock is used for task dispatching; the 8 levels of vectored interrupt priorities that may be added are compatible with Z80 interrupts. This is together with the software that is supplied or that may be selected, as for example programs for managing various alarms and interrupt real time management; 8K BASIC; Z80 assembler and disassembler; trace and debug programs; plotting software packages; data collection software packages, etc.

To enhance the anti-interference capability, there is power loss checking and RAM reserve power; there is a programmable internal storage write protection window; hardware implementation is a program-bound operation to guard against the crashing of programs and data by interference; there is monitoring during the operation of the hardware implementation programs to guard against the program entering an endless loop; there is also the capability of beginning from any preset arbitrary address during various fault warnings, or to determine a start-up address according to a record of the field state.

2. Expansion of the analog quantity input/output function

The analog quantity interface board for the FY-1 system has been designed in accordance with different needs. Various interfaces are controlled through ports, and it is easy to program operations. For systems where there is not a high requirement for precision, the MS-0801 may be used to accomplish the collection and control of analog quantities. The control precision for this analog interface board is 8-bits. The analog quantity interface board that is a higher level board for 8-bit precision is the MS-0804, which aside from having the same analog input channels as the MS-0801, has as many as 8 extra analog output channels, and can also output from 0 to 10 mA current signals.

For situations where the control precision requirements are higher, the MS-1208, MS-1209, or MS-1210 analog interface boards may be used. The outstanding characteristics of these multi-channel 12-bit analog input/output boards are their program controlled variable multiplier functions, by which can be randomly selected an enlargement multiplying power from 1 through 128. Figure 3 is a block diagram of the MS-1209. The collected analog quantities can be sent to multi-channel switches by the single-end input method and also by the dual-end (difference) method. 32-channel analog switches are used for 16-channels during dual-end switching time. A differential amplifier is used to improve common-mode rejection capabilities, for especially when using the dual port input method, there is stronger anti-interference. The program controlled amplifier may be controlled by program to add a total of 8 grades: X1, X2, X4, X8, X16, X32, X64, and X128. In this way, multi-channel analog signals of different amplitudes may be directly input from the channel switching, and at the same time as the channel number of selected, the program sets the gain control byte and the amplifier then can amplify correspondingly on the corresponding channel. Signals that have passed through a uniform scale then enter a sampling holder and an A/D converter. Digital quantities of 12-bit precision are passed to the CPU board in two bytes. The 12-bit D/A convertor maintains its data through the digital latch mode, where each D/A channel uses a D/A convertor, which is necessary for the controller system.

For the sake of economy, expansion of the analog input channels is by using expansion multi-channel analog switches, where with each addition of a MS-3101 may be added 96 single-end channels. Each channel expansion board uses 1 I/O port, so if 2 channel expansion boards are set up to share 1 port, there can also be the dual-end input method, where every 2 boards can switch between the H and L terminals.

The isolated analog input interface of the FY-1 system has various modes of accommodation. When there are few input channels, the MS-1220 capacitance isolation A/D board may be used. Because isolation is achieved by relay jumper capacitance to transfer the charge, and also a dual integrated low-speed A/D convertor is used, this can be economical when there are few channels. When there are more channels, then the MS-3402 isolated amplifier can be used with a

relay switch to achieve isolation. At this time, the isolated amplifier output can be connected to any A/D interface board in this system, analog input channels can be expanded using more MS-3401 moist-reed relay channel expansion boards. Although the cost of isolated amplifiers is rather high, because this sort of relay structure is simple it can be economical when there are many channels. Figure 4 is a schematic of the isolated channels.

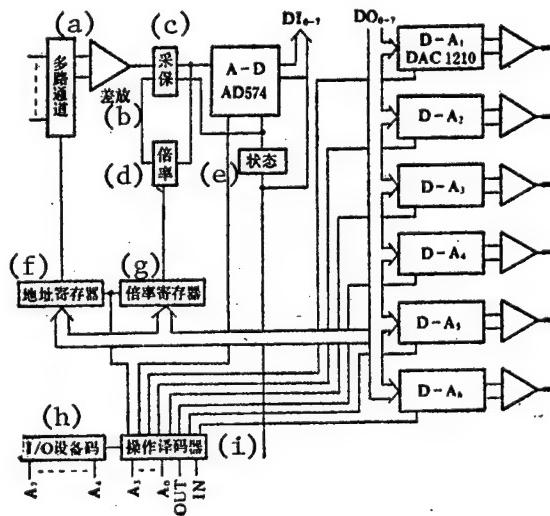


Figure 3. MS-1209 Block Diagram

Key:

- a. Multi-path channels
- b. Differential amplifier
- c. Sampling holder
- d. Multiplying power
- e. State
- f. Address register
- g. Multiplying power register
- h. I/O equipment code
- i. Operation decoder

The D/A convertors on this system, whether of 8-bit or 12-bit precision, can all be equipped with V/I convertors, which convert the output voltage signal to a current signal. The MS-3301 is a non-isolated voltage/current convertor board that is an 8-circuit current source composed of operational amplifiers and composite power crystal tubes, which allows the MS-1210 or MS-1208, MS-1209, and MS-0801 D/A convertors to output $0 \sim 10$ mA or $4 \sim 20$ mA current signals. In view of systems that need output isolation, the FY-1 system may also be fitted with an isolated V/I convertor board, which uses an advanced V/I convertor board to allow isolation between the on-site operating mechanisms and the host computer, and where each circuit is isolated. Figure 5 shows the isolation principles of the MS-3302.

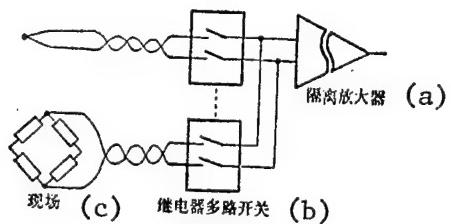


Figure 4. Buffered Schematic Block Diagram

Key:

- a. Buffered amplifier
- b. Relay multi-path switch
- c. Field

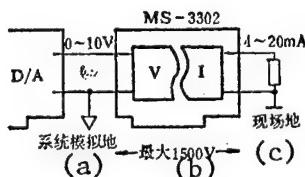


Figure 5. MS-3302 Buffering Principles Schematic

Key:

- a. System analog ground
- b. Maximum 1500V
- c. Field ground

3. Expansion of the switched volume input/output function

There are the following ways in which field switched values are input into the controlling system: adopt a polling method for large volume contact switch states; for small volumes it is necessary that the response speed of the computer be faster than the external events polled, so an interrupt input method is used; for those fields that need pulse counting, as for example for the measurement of flow volumes and rotation, the passing signals of tracks or conveyor belts, etc., use the counter chip with the integrated interrupts input method. Computer output control fields switched volumes are primarily level outputs, and there are also output pulse series necessary at certain times. In addition, certain fields require a serial or parallel mode with the field equipment to communicate volumes and transmit data and information.

The switched volume module boards of the FY-1 industrial measurement and control system take into full consideration the needs of field applications, and the MS4101 and the MS-4102 primarily provide switched volume polling and level output control. Each group of module boards provide 32 input/output channels, and also have parallel data communications contact signals and 2 channels of interrupt input. The MS-4401 provides 16-channel vectored priority interrupt input, at the same time having 3 channels of 16-bit counter input pulse volume or output clocked pulses. The MS-2102 provides 2 channels of serial data input/output.

Overall switched volume input/output uses optoisolators to effectively prevent interference, improve reliability, and increase transmission intervals. Inputs can be $0 \sim 48V$ signals, and outputs can provide 200mA of current, which can effectively adapt to field requirements.

The entire switched volume board can be flexibly configured in the system, and may be expanded to several hundred circuits and can easily be connected for use with microcomputers such as the Apple and the IBM-PC.

III. The System Working Mode Under Control of the Apple II/IBM PC Microcomputers

The MS-2202 board and the MS-2203 board can each convert and drive the Apple II on the S-100 bus. The FY-1 industrial control system can also leave the control of all Z80 CPU boards and use the MS-2202 or MS-2203 bus converter boards, while under control of the S-100 expansion chassis to directly control various A/D, D/A, initiate input, and initiate output interface boards through the Apple II/IBM PC.

Bus conversion is to allow one kind of bus to be defined as a new bus through a combinational logic network and also to drive, which is also called bus "adaptability."

At present, the two kinds of microcomputers most common in this country are the IBM PC and its compatibles and the Apple II and its compatibles. The characteristics of both these machines are that software is abundant for both, the design is complete, and system functions are powerful, but because these two machines are primarily personal computers designed for commercial, educational, and home uses, when they are used in laboratories or in industrial sites for data measurement, processing, and control, they cannot help but exhibit problems such as little physical space in which to expand and a deficiency in the assortment of available I/O interface boards. For example, there are at most only 8 bus expansion slots on the host boards of any one of these machines. For the average configuration, there are usually only about 2 of these empty, always fewer than the space needed for installation of I/O channels for data measurement and control at industrial sites; none of the Apple II switched volume interfaces have photoelectric coupled large scale integrated chips, and using MOS devices to connect directly with industrial field control mechanisms makes it very easy to be susceptible to damage from common mode voltage, current surges, and electrostatics. The PC is susceptible to the same problems when used for industrial control.

Because the functions of the S-100 bus series of I/O interface boards are so strong, they are quite closely concerned with field work, and the processing and exchange of field information is convenient. In this way, by using a bus converter board to connect these two systems one can make the most of the hardware and software superiorities of these two systems to quickly constitute an industrial control system with a full complement of functions, that is convenient, and for which application achievements can be rapidly disseminated.

The 16-bit memory mapped I/O addresses of the Apple II must be converted into the 8-bit independent I/O address bus of the S-100 bus. Be it an Apple II or an IBM PC, their definitions of data lines and their bit widths are both the same as on the S-100 bus. Therefore, as long as you use a bidirectional data bus driver you can convert and drive data point lines. While timing relations for control lines between different buses are not the same, the bus converter board does a corresponding modulation, finally allowing the Apple II/PBM PC to achieve "adaptability" with the S-100 bus.

After conversion, the buses can execute read/write and interrupt operations at the highest main processor clock of 8 MHz. The I/O spaces provided by the bus converter board are 256 consecutive addresses (including the two address used by the bus converter board), and 8 vectored interrupt lines on the S-100 bus can also generate priority interrupt requests through the bus converter board. The DC drive capacity for each signal line on the bus converter board is a 30 standard LSTTL load. Figure 6 is a configuration diagram for the MS-2202 bus converter board.

IV. Remote Communications With the FY-1 System

Many applications fields require dispersed control with centralized management. This can be quite easily realized using the FY-1 system. For example, each control subsystem can be configured as in Figure 7.

The SC-801C is the system host board. The MS-2102 serial/parallel/counter/timer interface board provides 48 circuit digital quantities input/output, which can be used for field control or for the interactive reading in of board parameters, and the 2-line counter/timer can be the system clock or for overtime control, the 2-circuit serial port being used for network communications. Other analog quantity or switched quantity I/O interface boards can be configured as needed.

The two serial ports on the MS-2102 board can both supply standard RS-232 communications or can provide optoisolated current loop communications. At the 300 baud rate, ordinary electric lines or telephone may be used for transmitting over several km, both stably and reliably. For general remote sensing and remote control situation, this can meet the requirements when used for receiving and issuing commands and timing the collection of overall data.

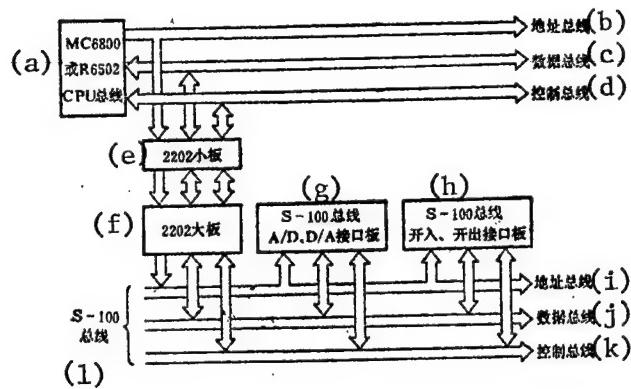


Figure 6. Configuration Diagram for MS-2202 in System

Key:

- a. MC6800 or R6502 CPU bus
- b. Address bus
- c. Data bus
- d. Control bus
- e. 2202 small board
- f. 2202 large board
- g. S-100 bus A/D, D/A interface board
- h. S-100 bus switched input, switched output interface board
- i. Address bus
- j. Data bus
- k. Control bus
- l. S-100 bus

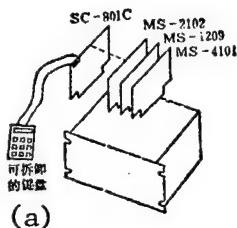


Figure 7. Control Subsystem Configuration

Key:

- a. Detachable keyboard

The on-line network method can use a loop or star model.

When using the loop structure, you can use the packet switching memory exchange mode. Reception at a serial port at every node determines whether the command has been given for that node. If it has, it intercepts the packet; if not, after inspection it passes it on to another serial port.

When using the star form, you can use the MS-2101 intelligent 8 serial port distributor, another system made by our plant. The equipment number is first transmitted, after which it can enter the communications process.

When using the MS-2102 board, the FY-1 system can conveniently do machine-to-machine exchanges of information with various microcomputers having RS-232 interfaces. For example, the IBM-PC has the RS-232 interface, a current loop interface, and management software; after installation of a serial card, the Apple II has RS-232 interfaces and current loop interfaces, as well as interface software; connecting together the FY-1 system, one can use both BASIC to control batch exchanges of data and also you can also send out keyboard characters and receive commands from peripherals, displaying all on the screen.

The FY-1 industrial measurement and control system has been successfully developed in recent years through a summation and improvement of achievements made regarding large numbers of microcomputers in this country being used for process control. Because the scales of system configuration can be both very small and sufficiently large, this system shows its superiorities in terms of both economy and flexibility.

Price List for the Square Circle, Beijing Computer Fittings Plant No 5

	Model #	Function and name	price: yuan
FY-1 industrial measure- ment and control system selected parts	SC-801C	Z80 industrial control single-board computer, separate keyboard, bus driver capability of 24 mA	760
	MS-9201	Monitor/printer interface, 2-56K memory expansion board	640
	MS-9101	Industrial control single-board computer, 8-level prioritized interrupt manage- ment non-volatile clock-calendar	1,800
	MS-2102	Serial/parallel/counter/timer board	600
	MS-0801	8-bit, 8 input, 2 output AD/DA board	490
	MS-0804	8-bit, 8 input, 8 output AD/DA board; DA has electronic clearing, current output capability	980
	MS-1208	12-bit, 32 input, 2 output AD/DA board; DA has programmable amplification, optional selection of CTC timer circuit	2,150
	MS-1209	12-bit, 32 input, 6 output AD/DA board; AD has programmable amplification	2,990
	MS-1209A	12-bit, 16 input AD board; AD has programmable amplification	1,990

	Model #	Function and Name	price: yuan
FY-1 industrial measure- ment and control system selected parts	MS-1209B	12-bit, 32 input, 6 output AD/DA board; AD has programmable amplification, channels are protected, DA has electronic clearing capability	3,150
	MS-1209C	12-bit, 16 input AD board; AD has programmable amplification, channels have protection	2,090
	MS-1210	12-bit, 8 circuit independent DA board	1,990
	MS-4101	24 input, 8 output, optoisolated switched quantity I/O board	880
	MS-4102	8 input, 24 output, optoisolated switched quantity I/O board	880
	MS-4401	Multi-interrupt quantities/pulse quantities I/O interface	1,200
	MS-3101	96 channel single terminal -5V~+5V input channel expansion board	960
	MS-3301	8 channel V/I converter board	
	MS-3302	4 circuit buffered V/I converter board, voltage tolerance of 1500V	
	MS-3401	16 circuit moist-reed relay channel expansion board	
	MS-5101	Moist reed relay channel switch buffered amplifier board, voltage tolerance of 500V	
	MS-1220	Capacitance buffered dual integral 13-bit AD board	
	5/S-100	5-slot S-100 bus insertion slot chassis	480
	10/S-100	10-slot S-100 bus insertion slot chassis	600
	15/S-100	15-slot S-100 bus insertion slot chassis	1,000
	20/S-100	20-slot S-100 bus insertion slot chassis	1,200
	MS-2011	32 circuit signal end-board, configured for MS-1208/1209	150
	WWY-62	+5V 3A, +8V 2A, ±18V 0.8A, +25V 80mA regulated power supply	400
	FY-1 computer case can add computer, with fan		
	WWY-63	system service power supply	
Misc. products	MS-1211	12-bit, 16 input, 4 output AD/DA board, AD w/programmable amplification, selectable CIC timer circuit, directly configurable with TRS-80, BCM-III, BCM-80, BCM-81	2,300
	MS-1212	Apple II hardware 12-bit, 16 circuit AD card, with filtered protection	920
	MS-1213	Apple II hardware 12-bit, 16 channel AD/8-bit 4 channel DA card with channel protection	1,590
	MS-1215	IBM PC/XT hardware 12-bit, 16 input, 2 output AD/DA board, with single end/filtered protec- tion board, with AD alignment board and soft- ware	2,500
	TP-801A	Single-board computer (batch preference)	390
		Microcomputer data collection and control system	1,200

12586/8309
CSO: 4008/1022

NEW CIRCUITS DESCRIBED FOR AFC

Beijing DIANZI KEXUE JISHU [SCIENCE AND TECHNOLOGY OF ELECTRONICS] in Chinese
Vol 16 No 7, 10 Jul 86 pp 19-21

[Article by Chen Zhiheng [7115 1807 1854], Institute No 36, Ministry of
Electronics: "Analog-Digital Hybrid Automatic Frequency Control"]

[Text] There have been many schemes for achieving automatic frequency control, but there are many deficiencies in the common schemes of detuned circuit frequency discriminators and phase-locked loops, which cannot satisfy the requirements of high precision. We introduce in this paper a new scheme for automatic frequency control, namely, the analog-digital hybrid scheme. In comparison with the two aforementioned schemes, it has the advantages of:

1. It is quick to control, and having a broad pull-in range;
2. there can be automatic frequency control whether for carrier wave signals or for already demodulated signals, where that control function is accurate, reliable, and without erroneous locking;
3. theoretically speaking, this scheme is an error free control system, where as long as there is a frequency differential of f_d , fine tuning will continue until $f_d=0$, so control precision is quite high;
4. there is no LC loop, and the majority of components are digital circuits, so the temperature characteristics are much more optimum than for the detuned circuit frequency discriminator.

A diagram for this scheme is shown in Figure 1.

Working Principles:

The secondary IF signal f_{IF} passes through limiting amplification and shaping to become a pulse signal, then goes through a secondary $\div 10$ circuit, where a 10.7 MHz IF signal becomes a 107 kHz signal. This signal is divided into two circuits, where one circuit goes through a phase shifter to shift the phase $-\pi/4$, and then enter the mixer I. The other circuit passes through a phase shifter to shift the phase $+\pi/4$, and then enter mixer II. This is the working process for channel A.

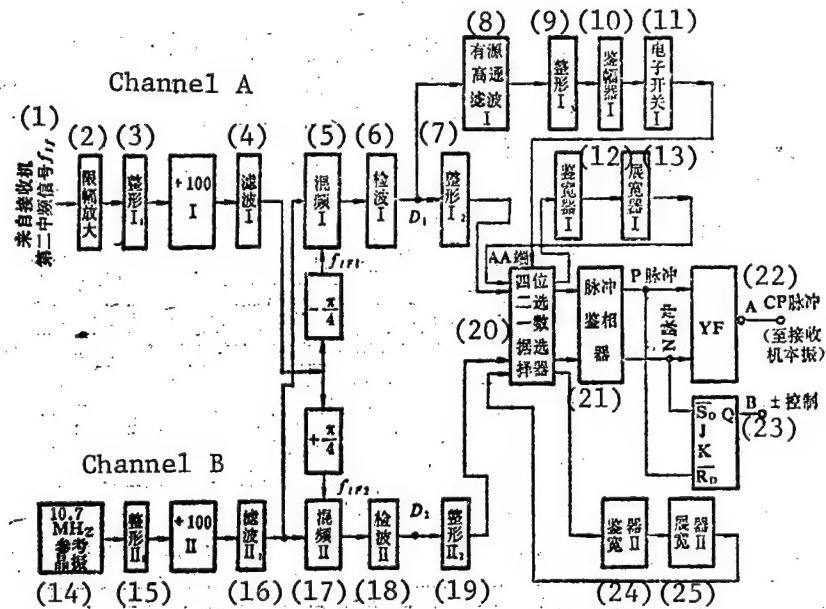


Figure 1.

Key:

- | | |
|---|--|
| 1. Secondary signal f_{IF} coming from receiver | 14. 10.7 MHz reference crystal oscillator |
| 2. Limiting amplification | 15. Shaper II ₁ |
| 3. Shaper I ₁ | 16. Filter II ₁ |
| 4. Filter I | 17. Mixer II |
| 5. Mixer I | 18. Detector II |
| 6. Detector I | 19. Shaper II ₂ |
| 7. Shaper I ₂ | 20. Terminal AA 4-bit one-from-two data selector |
| 8. Active high-pass filter | 21. Pulse phase detector |
| 9. Shaper I ₃ | 22. Pulse P pulse N YF pulse CP (to receiver local oscillator) |
| 10. Amplitude detector I | 23. B control |
| 11. Electron switch I | 24. Bandwidth detector II |
| 12. Bandwidth detector I | 25. Stretcher II |
| 13. Stretcher I | |

The 10.7 MHz signal put out by the reference crystal oscillator goes through a similar shaping, frequency division, and filtering, to obtain signal f_r output to mixers I and II. The signal after mixing goes through detection to obtain the slip frequencies D_1 and D_2 .

Because signal f_{IF} has already divided into two signals f_{IF1} and f_{IF2} with phase differentials of $\pm\pi/4$ before mixing, these two slip frequency signals of phase differential $\pi/2$ are amplified, detected, and shaped within each channel, and converted into square waves.

The envelope after detection can be approximately expressed by the following formula:

$$D_1 = A \sin (2\pi f_{dt} t + \theta)$$

$$D_2 = A \cos (2\pi f_{dt} t + \theta)$$

where the phase differentials for D_1 and D_2 are $\pi/2$, and where θ is the initial phase when $t=0$. $f_d = f_{IF} - f_r$, the value of which may be positive or negative. D_1 is the sine function, changing as the sign of f_d changes, that is, the sign of D_1 changes, signifying that its phase has changed π (GU) degrees. D_2 is the cosine function, a signal that does not change with changes in f_d , and that therefore may serve as a reference phase. The polarity of D_1 may be determined by the changes in the sign of f_d . This is why the signal f_d is divided into two orthogonal signals.

After shaping, the signals D_1 and D_2 change into square waves. When the two square waves are added to a 4-bit one from two data selector under the control of the electronic switch I, and when this causes the slip frequency $f_d \geq 25$ kHz, this is directly added to a pulse phase detector for phase detection. If the slip frequency $f_d < 25$ kHz, and the input signal is also an angle modulated signal with a very large modulation exponent, then the modulation effect will be very serious and the phase detector cannot operate normally, in which case there cannot be automatic frequency control.

To eliminate the modulation and noise components and broaden the pull-in range, when the slip frequency $f_d < 25$ kHz, the signal is first sent to a bandwidth detector and a stretcher, and is then input to a pulse phase detector. This process occurs automatically through circuits.

The two signals that have been processed by the bandwidth detector and the stretcher can easily generate asymmetry. To expand the pull-in bandwidth, when the frequency differential f_d is larger (i.e., $f_d \geq 25$ kHz) and the effects of modulation are less, the signal is directly sent to the pulse phase detector and does not pass through the bandwidth detector and stretcher. Regarding the size of the slip frequency f_d , the control circuits can automatically determine this and accurately handle it.

The PN pulse output by the pulse phase detector is on one circuit sent to the NAND gate YF, producing the pulse CP through the A terminal; the other circuit sends to the S_D and R_D terminals of the JK flip-flop, to obtain the positive/negative control signal through terminal B. At the same time, these two signals are sent to the frequency synthesizer of the receiver. Whether the frequency differential $f_d > 0$ or $f_d < 0$ causes the local oscillator frequency to drop or rise correspondingly, consequently allowing the receiver to accurately trace the external signal.

Rapidly changing demodulation components have seriously interfered with the normal performance of AFC. If this cannot be eliminated to the greatest degree, then accurate PN pulses cannot be generated, and therefore overcoming the effects of demodulation is a very crucial problem. The primary means to do this are: limiting, frequency division, filtering, and pulse bandwidth detection.

Below, we stress the pulse bandwidth detection method, which is to send the square pulse after frequency division and filtering to the pulse bandwidth detector for bandwidth detection processing, filtering out nonprescribed pulses.

The circuit diagram for this is shown in Figure 2, and Figure 3 is a wave-form diagram of the signals at each level of the pulse bandwidth detector.

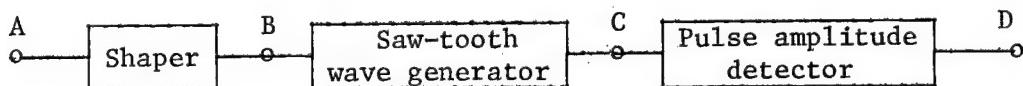


Figure 2.

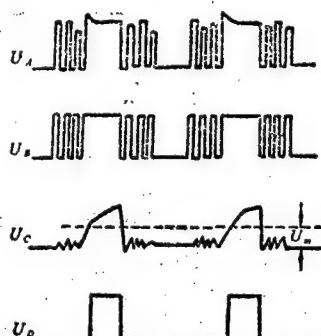


Figure 3.

Input pulses of different amplitudes and bandwidths are first sent to shaping circuits to make them keep the same pulse width and amplitude as the originals, as shown in Figure 3 U_B . Then sending U_B to a saw-tooth wave generator, where the charging period of the saw-tooth wave generator is determined by the pulse bandwidth, and therefore, as the pulse width broadens, the charging period lengthens, and the saw-tooth wave crest value that is output is greater; conversely, the shorter the charging period, the less the value of the output crest, as shown in U_C . Again through the pulse amplitude detector, signals with amplitude less than U_m are not output, thereupon obtaining the wave form as shown for U_D .

It can be seen from the wave form shown in Figure 3 that because of demodulation or noise, the front and rear rims of the pulses have many nonprescribed narrow pulses, which is the rapid drift component created by demodulation and noise. By passing through the pulse bandwidth detector, this goal of eliminating these pulses may be met.

The process of generating PN pulses will be abridged here due to limitation of space, but we should emphatically point out the following characteristics of PN pulses:

1. PN pulse recurrent frequencies should be corrected in relation to the slip frequency f_d ;
2. when $f_d > 0$, i.e., when the second IF signal is higher than the reference frequency f_r , that should generate the N pulse, causing the reversible counter of the frequency synthesizer to begin subtracting, causing the receiver local oscillator frequency to drop, which can result in $f_d \rightarrow "0"$;
3. when $f_d < 0$, i.e., when the second IF is lower than the reference f_r , this should generate the pulse P, causing the reversible counter to begin adding, in this way causing the local oscillator frequency to rise and $f_d \rightarrow "0"$;
4. for arbitrary transients as AFC is in operation, it is not permitted that at the same time there be P and N pulses, and when $f_d=0$, there are never PN pulses (at this time, the periods for PN pulses change to infinity).

Experiments have shown that this scheme can effectively carry out automatic frequency control, whether on carrier wave signals or for AM, FM, or phase modulated signals, as well as for double modulated signals, and, moreover, that this is quick, the pull-in range is broadened, and control is more precise. The designed circuits have been tested overall, routine testing has been carried out, and satisfactory results have been obtained, and they have been technically appraised throughout.

12586/9365
CSO: 4008/1021

APPLIED SCIENCES

GENERALIZATION OF LASALLE'S THEOREM

Beijing YINGYONG SHUXUE XUEBAO [ACTA MATHEMATICA APPLICATAE SINICA]
in Chinese Vol 9 No 3, Jul 86 pp 273-281

[English abstract of article by Wang Ke [3769 0344] of Northeast Normal University]

[Text] In this paper the author generalizes the well-known LaSalle's theorem for positive limit set of the n-th order nonautonomous systems. The author omits some restrictions on the right hand control terms. Therefore, these theorems are much more convenient and more flexible in applications.

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APPLIED SCIENCES

DISCRETE OPERATOR METHOD OF TWO PHASE (OIL AND WATER) IMMISCIBLE FLOW DISPLACEMENT PROBLEM AND ITS NUMERICAL ANALYSIS

Beijing YINGYONG SHUXUE XUEBAO [ACTA MATHEMATICA APPLICATAE SINICA]
in Chinese Vol 9 No 3, Jul 86 pp 296-308

[English abstract of article by Yuan Yirang [5913 4135 6245] and Wang Wenqia
[3769 2429 3174] of Shandong University]

[Text] Infusing water into an oil reservoir by a high pressure pump to squeeze the oil residue out of oil wells is a problem of two-phase immiscible flow displacement. The mathematical model of the problem is the initial problem of systems of partial differential equations. The authors set up some computation schemes of the discrete operator method, studying approximation and convergence theory. Computation of the model problems yield satisfactory results.

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9717

CSO: 4009/1036

APPLIED SCIENCES

DYNAMIC CALCULATION AND ANALYSIS OF PENETRATION OF TARGET PLATES BY TRUNCATED CONICAL PROJECTILES

Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS] in Chinese Vol 7 No 11, Nov 86 pp 1033-1038

[English abstract of article by Gao Shiqiao [7559 0013 2890] of Shanghai Institute of Applied Mathematics and Mechanics, Shanghai; Wang Baoxing [3769 1405 5381] of Beijing Institute of Technology, Beijing]

[Text] In this paper, dynamic calculation and analysis are made of penetration of thin plates by truncated conical projectiles in terms of the needs of fuse design. The impact velocity ranges from 200 m/s to 1000 m/s (including both low and high velocities). The target plates include thin aluminum plates (metal) and plywood (non-metal).

Because a strength effect of target plates is considered in the establishment of dynamic models, the authors are able to solve the problem of some previous models that were not suitable for low-velocity impact, e.g., Zaid and Paul's models. By comparing the inertial effect with the strength effect, Zaid and Paul's experimental conclusion is theoretically proved. Only when the impact velocity is more than 500 m/s can the strength effect be neglected. In all other cases this effect cannot be neglected. (Paper received 4 Oct 85.)

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APPLIED SCIENCES

NUMERICAL MODELING OF POLLUTANT TRANSPORT BY WIND-DRIVEN CURRENT IN BOHAI SEA

Beijing HAIYANG YU HUZAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese Vol 17 No 5, Sep 86 pp 410-419

[English abstract of article by Dou Zhenxing [4535 2183 5281], et al., of the Institute of Marine Environmental Protection, State Oceanic Bureau, Dalian]

[Text] The main purpose of this paper is to examine the pollutant transport capacity of wind-driven circulation in the Bohai Sea. Both the previously developed water quality model and the seasonal mean wind-driven circulation model of the Bohai Sea are applied to calculate the temporal and spatial dispersal of the organic pollutant (COD) flowing into the sea from 28 source sites along the coasts. The effects of seasonal wind on the COD concentration field produced by the tidal current dispersion have been investigated.

The results obtained show that the mean wind-driven current has a minor effect on the concentration field induced by the tidal current. Through numerical calculation of the net pollution transport by wind-driven current the authors find that the mean wind-driven circulation in Liaodong Bay is advantageous to the outflowing pollutant transport, and that in Bohai Bay the winter mean wind-driven circulation has a greater capacity for physical purification than the summer mean wind-driven circulation. This is one of the main reasons that the water quality is better in the Bohai Sea in winter than in summer.

(Paper received 25 Jun 84.)

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CSO: 4009/1039

IMPROVING CONTACT FATIGUE STRENGTH OF CARBONITRIDING GEAR STEEL 25MnTiBR
WITH RETAINED AUSTENITE

Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 22 No 4,
18 Aug 86 pp A297-A303

[English abstract of article by Jiang Bingyuan [1203 4426 0337], et al., of
Luoyang Institute of Technology]

[Text] A study has been made of the behavior of retained austenite in improving the contact fatigue strength of the carbonitriding gear steel 25MnTiBR by means of the contact fatigue test, fracture mechanics analysis of spalling on the contact surface and an energy estimate of the crack tip plastic zone. The retained austenite deformation induces the martensite transformation, which absorbs energy that is more than one-half of the strain energy of the material. It may retard the propagation of fatigue cracking and may improve the contact fatigue strength of the carbonitriding steel 25MnTiBR with retained austenite. The proper material, together with a reasonable technique chosen for production practice, may be available to obtain more, but not very stable, retained austenite in the surface layer of the gear. In particular, it may improve the gears under heavy loads.
(Paper received 17 Sep 84; finalized 18 Apr 85.)

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APPLIED SCIENCES

INFLUENCE OF ADDITIVE Sr OR Sb ON MODIFICATION OF Al-Si ALLOYS

Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 22 No 4,
18 Aug 86 pp A310-A316

[English abstract of article by Huang Liangyu [7806 5328 0151], et al., of
the Department of Materials Science and Engineering, Shanghai Jiaotong
University]

[Text] The modification of five Al-Si alloys of different purities and compositions with 9-14 wt-percent Si at various cooling rates influenced by an additive Sr or Sb has been investigated in detail by means of SEM, EPMA, etc. The microstructural nomograph of these Al-Si alloys is constructed to provide for the selection of the optimum addition of Sr or Sb in production practice. Experimental results indicate a threshold of Sr content in Al-Si alloy modification in which, if surpassed, the structure of the Al-Si alloy may be completely modified, even if the cooling rate is slowed down to 4.5°C/min. The threshold increases with the decrease of the cooling rate. Both Sr and Sb can retard the initiation of Si precipitation, but they differ in their influence on the growth form of eutectic Si. (Paper received 5 Nov 84; finalized 1 Aug 85.)

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EFFECT OF GRAPHITE NODULES ON FRACTURE TOUGHNESS OF NODULAR CAST IRON

Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 22 No 4,
18 Aug 86 pp A321-A333

[English abstract of article by Li Zhonghua [2621 0022 5478], et al., of
Xi'an Jiaotong University]

[Text] A model with local composite structure is used to simulate the micro-structure of nodular cast iron at a small crack tip region of the three-point bending specimen. This model permits the authors to get a solution closely approaching the solution of a real material. The J-integral in a material with composite structure is discussed. It is found that the fracture toughness of nodular cast iron is practically the fracture toughness of steel with holes. The effects of the graphite shape, size, volume fraction, etc., on the stress intensity factor and fracture toughness of nodular cast iron are also examined. In the finite element calculation, the elastoplastic increment theory with finite deformation is used. The calculated results agree well with experimental data. (Paper received 19 Nov 84; finalized 27 May 85.)

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STRESS-INDUCED TRANSFORMATION IN SUPERELASTIC NiTi ALLOY

Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 22 No 4,
18 Aug 86 pp A337-A340

[English abstract of article by Jin Jialing [6855 0857 7117], et al., of
Shanghai Institute of Iron and Steel Research]

[Text] The process of stress induced transformation in 51.6 at-percent Ni-Ti alloy has been studied by means of X-ray diffraction and TEM equipped with a loading attachment. The results show that the process may proceed as two stages: premartensitic and martensitic transformations. It seems to be reversible with unloading. (Paper received 2 Mar 85; finalized 11 Nov 85.)

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APPLIED SCIENCES

STRUCTURAL INHOMOGENEITY AND CRYSTALLIZED METASTABLE PHASE OF BNi₂ RIBBON
RAPIDLY QUENCHED FROM ITS MELT

Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 22 No 4,
18 Aug 86 pp B158-B163

[English abstract of article by Wu Yukun [0702 3768 3824] of the Institute of Metal Research, Chinese Academy of Sciences, Shenyang]

[Text] By using X-ray diffraction and TEM techniques, it is shown that the inside of the single roll quenched ribbon of a BNi₂ alloy, namely, Ni₇₀Cr₇-Fe₃Si₈B₁₂, is amorphous, but both the free and roll sides of this amorphous ribbon consist of Ni crystals with a preferred orientation of 111 parallel to the ribbon surface. This structural inhomogeneity implies that the momentum transport mechanism plays an important role during the solidification process of this ribbon. In addition, the unknown metastable phase appearing in the second stage of crystallization is a fcc phase with a ≈ 1.04 nm of the M₂₃B₆ type. (Paper received 7 Dec 84.)

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CSO: 4009/1038

APPLIED SCIENCES

INFLUENCE OF REACTION AND RELAXATION RATE COEFFICIENTS ON GAIN CHARACTERISTICS
IN HF CHEMICAL LASERS

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 13 No 11,
20 Nov 86 pp 675-682

[English abstract of article by Chen Liyin [7115 7787 0692] and Zhou Xuehua
[0719 1331 5478] of the Institute of Mechanics, Chinese Academy of Sciences]

[Text] The effects of different velocity ratios of two parallel gas flows and
the uncertainty of kinetic rate coefficients on the characteristics of HF
chemical lasers are investigated. It is shown that the collisional relaxation
process of HF(v)-H is so fast that the variation of its rate coefficient has
a significant influence on the gain characteristics.

EXPERIMENTAL STUDY OF UNSTABLE CAVITY INJECTION MODE-LOCKED TEA-CO₂ LASER

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 13 No 11,
20 Nov 86 pp 687-689

[English abstract of article by Xu Huale [1776 5478 2867], et al., of Shanghai
Institute of Optics and Fine Mechanics, Chinese Academy of Sciences]

[Text] An unstable cavity injection mode-locked TEA-CO₂ laser with 1 m long
gain medium is described. It can operate in a single longitudinal mode
without adjusting the cavity length. Under some conditions injection mode-
locking happens and two lasers individually oscillate in different branches.

APPLIED SCIENCES

'KEYHOLE' MECHANISM IN WELDING THIN PLATES WITH LOW POWER CO₂ LASER

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 13 No 11, 20 Nov 86 pp 690-694

[English abstract of article by Pu Wanlin [5543 8001 2651], et al., of Huazhong University of Science and Technology]

[Text] A new effect has been discovered in welding thin metal plates with a low power CO₂ laser. In the welding process, a small hole exists in the welding puddle and penetrates the plate. This effect has been proven experimentally for the first time. The conditions of power and energy density have also been investigated experimentally and theoretically.

NEW EXCITING METHOD FOR OPTICAL FIBER MEASUREMENT

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 13 No 11, 20 Nov 86 pp 695-698, 686

[English abstract of article by Shi Zhengdong [2457 7201 2639], et al., of Shanghai Institute of Ceramics, Chinese Academy of Sciences]

[Text] This paper analyzes some typical exciting conditions in optical fiber measurement and proposes a new equilibrium mode distribution method in which a "S.S.F." mode stripper is used to greatly improve the measurement accuracy of the fiber loss. It provides an effective and reliable exciting method for accurate measurement of optical fiber parameters.

HOLOGRAPHIC TECHNIQUE USED IN PHASE DIFFERENCE AMPLIFICATION

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 13 No 11, 20 Nov 86 pp 699-703

[English abstract of article by Chen Jianwen [7115 1696 2429], et al., of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences]

[Text] A method for eliminating wavefront aberrations used in phase difference amplification is proposed. Two holograms were inserted in two optical paths of a Mach-Zehnder interferometer respectively. One of the holograms recorded the information of both object phase and wavefront aberration of the system, while the other recorded only that of the wavefront aberration. When reconstructing, the wavefront aberration can be eliminated and the amplified phase difference obtained. The experimental results are given.

APPLIED SCIENCES

GROWTH AND MEASUREMENT OF GGG (Ca, Mg, ZR):(Nd, CR) LASER CRYSTALS

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 13 No 11,
20 Nov 86 pp 710-713, 706

[English abstract of article by Xun Damin [5424 1129 2404] of Tianjin Institute
for Advanced Studies of Science and Technology, Photoelectric Technique
Research Institute; Zhu Huanan [2612 0553 0589], et al., of the Institute of
Physics, Chinese Academy of Sciences]

[Text] Gadolinium gallium garnet (GGG) crystals substituted with Ca, Mg and Zr,
and doubly-doped with Nd and Cr, are grown, and their laser properties are
investigated. Transparent and perfect boules measuring $\varphi 18 \times 60\text{--}80$ mm are
grown by means of the Czochralski method using an iridium crucible and induct-
ing heating. Laser rods of $\varphi 5 \times 40$ mm are machined. The output slope effi-
ciency obtained is 0.7. A comparison is made of the spectroscopic properties
and lattice constant of the crystal with those of the GGG crystals doubly doped
with Nd, Cr and substituted with a small amount of Sc, and a discussion is
given.

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CSO: 4009/15

APPLIED SCIENCES

WORK FUNCTION CALCULATIONS FOR W(100)-Cs ADSORBED SYSTEMS BY 'JELLIUM ON ATOMIC SLAB' MODEL

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 6, Nov 86 pp 408-415

[English abstract of article by Wang Ning [3769 1337] of Beijing Vacuum Electronics Research Institute; and Wang Dingsheng [3769 7844 4141] of the Institute of Physics, Chinese Academy of Sciences]

[Text] The work functions of transition metals vary drastically with the coverage of adsorbed alkali or alkaline earth metal atoms. This phenomenon is studied theoretically by a refined model, i.e., the transition-metal substrate is treated with high accuracy by the film LAPW method, while the simple metal overlayer is simulated by the jellium model. Computation of the electronic structure of the adsorbed system with a coverage lower than that of the monolayer will become possible using this model. The variations of work function (Φ) with the coverage (θ) of Cs on the W-substrate are presented. The calculated $\Phi_{\min} = 1.44-1.48$ eV is in good agreement with the experimental values (1.35-1.55 eV). The close dependence of the results on the choice of the parameter E_V is also discussed. (Paper received 13 May 85; revised 24 Jun 86.)

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APPLIED SCIENCES

RELATIONS OF BARIUM-TUNGSTEN CATHODE PROPERTIES TO TUNGSTEN MATRIX STRUCTURE

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 6, Nov 86 pp 422-448

[English abstract of article by Wu Zhaohao [0702 0340 4110] of the Institute of Electronics, Chinese Academy of Sciences]

[Text] Some data of emission and evaporation properties referring to the tungsten matrix structure of an impregnated cathode are analyzed. The results indicate that the particle size of the tungsten powder and the pore size in the porous matrix determine the total inside surface area of all pores, the diffusion length of barium over the tungsten grain surface, and the diameter and length of the path through which the barium travels. These factors all relate to the properties and operation mechanism of the impregnated cathode; therefore, it would not be strictly correct to employ only matrix porosity for characterizing the cathode properties. Finally, the preferred structure of the porous tungsten matrix, which depends on different applications of the impregnated cathode, is proposed. (Paper received 16 Apr 85; revised 12 May 86.)

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MICROPROCESSOR-BASED GENERATOR FOR SYNCHRONIZING SIGNAL AND TEST CARD FOR COLOR TV

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 6, Nov 86 pp 449-456

[English abstract of article by Xia Yongping [1115 3057 1627], et al., of the Department of Electronic Science and Engineering, East China Normal University]

[Text] A color TV's test card is a signal widely used to evaluate visually the quality of a TV set. Based on the microprocessor Z-80, a test card generator for color TVs with synchronizing is realized. By taking advantage of microprocessor programming, the digital and IC computer techniques are combined to greatly simplify the system circuits which originally needed a large quantity of logical gates. Now the control functions and signal generations, such as compound synchronous signal and compound blanking signal, etc., are realized with the help of CPU programming to gain the advantages of low cost, high reliability and small size. All system programs are stored in EPROMS and, therefore, any wanted changes in the test card pattern can be conveniently realized by changing programs without changing the whole configuration of the hardware circuits. The system can also be transferred into different types of non-standard TV synchronizers and test card generators by only changing the programs. (Paper received 20 Dec 84; revised 29 Oct 85.)

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HIGH-ORDER AR ESTIMATOR OF ARMA SPECTRUM

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 6,
Nov 86 pp 457-461

[English abstract of article by Yu Huili [0151 6540 6849] of Research Institute
No 634, Ministry of Aviation Industry]

[Text] In this paper, the high-order AR estimator of the ARMA power spectrum and the criterion for determining the order by whitening the noise of the AR order are given. Due to the fact that the high-order AR estimator relates to problems of ill-condition and algorithmic robustness in numerical computation, the Householder transform recursive algorithm is used to solve the high-order AR parameter estimation. The results obtained are satisfactory.

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COMPUTER-AIDED ANALYSIS OF DOUBLE-DRIFT-REGION IMPATT DIODE

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 6, Nov 86 pp 416-422

[English abstract of article by Fang Xizeng [2455 1585 2582], et al., of the Institute of Electronics, Chinese Academy of Sciences]

[Text] The results calculated by a computer for the double-drift-region IMPATT diode on an 8 mm waveband are reported. A comparison between single-drift and double-drift diodes is presented. The advantage of double-drift devices in respect to power output and efficiency is given. In addition, effects of the doping profile, current density and RF voltage on the performance of these devices are investigated. The theoretical data for designing the double-drift IMPATT oscillator and amplifier on an 8 mm waveband is also given. (Paper received 5 Oct 84; revised 21 Jan 86.)

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COMPUTER-AIDED ANALYSIS FOR TRANSFER CHARACTERISTICS OF WAVE DIGITAL FILTER

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 6, Nov 86 pp 462-468

[English abstract of article by Du Yuzeng [2629 5940 2582], et al., of Beijing Institute of Aeronautics and Astronautics]

[Text] An approach for finding the transfer characteristics of wave digital filters is presented and a general computer program is developed. The program can be used to analyze the quantification effect of different coefficient word-lengths on the transfer characteristics of wave digital filters, thus making it possible to make a reasonable choice of coefficient word-length in order to take into account the economics as well as the technical specifications in the hardware implementation of wave digital filters. (Paper received 2 May 85; revised 30 Jun 86.)

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APPLIED SCIENCES

CALCULATION OF RADIATION CHARACTERISTICS OF ANTENNAS ADJACENT TO RECTANGULAR CYLINDER REFLECTOR BY GTD

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4, Jul 86 pp 241-246

[English abstract of article by Sun Naihua [1327 0035 5478], et al., of the Microwave Research Laboratory, East China Normal University]

[Text] In this paper the horizontal radiation characteristics of dipole and loop antennas adjacent to a rectangular cylinder reflector are calculated by the application of GTD. The magnitudes of the direct field, reflected field and diffracted field from the edges of the cylinder at the field point are calculated and compared. The effects of the dimensions of the cylinder, the relative positions of the antennas with respect to the cylinder and the method of feeding to the resultant field pattern are analyzed. Using the method described, optimum design can be carried out to obtain the optimum omnidirectional radiation characteristics of antennas with reflectors of this kind. (Paper received 17 Sep 84; revised 22 Nov 85.)

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RAPID METHOD FOR DESIGNING TWO-D DIGITAL FILTERS

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4,
Jul 86 pp 255-264

[English abstract of article by Yi Kechu [2496 0344 0443] of Northwest Telecommunication Engineering Institute, and Jia Yumin [6328 5940 3046] of Xi'an Modern Chemistry Institute]

[Text] The existing methods for designing two-dimensional digital filters are outlined and a new method--the composite method--is proposed. This method has the following advantages: (1) its computation cost is low; (2) it is easy to acquire linear phase performance using it; (3) it can be conveniently generalized for use with multi-dimensional digital filters; etc. Some experimental results show that this method produces better results with lower computation cost than does the two-dimensional window method. Therefore, it can be applied not only to image processing systems and other computer systems for programming software, but also to some research that involves two-dimensional or multi-dimensional digital filtering. (Paper received 20 Aug 84; revised 15 Dec 84.)

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INTERACTIONS OF P-InP WITH Au-Zn, Ti/Au, Pd/Au, Ti/Pd/Au AT INTERFACE AND THEIR ELECTRICAL PROPERTIES

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4, Jul 86 pp 265-271

[English abstract of article by Zhang Guicheng [1728 2710 2052], et al., of the Shanghai Institute of Metallurgy, Chinese Academy of Sciences; and Yu Zhizhong [0205 1807 0022] of Shanghai Institute of Measurement Technique]

[Text] In this report, interdiffusion of p-InP with Au-Zn, Ti/Au, Pd/Au and Ti/Pd/Au at the interface has been investigated by Auger electron spectroscopy and electron spectroscopy for chemical analysis. The surface morphology for heat treatment has been observed with scanning electron microscopy.

It is found that the in-diffusion of Au is easier than that of Pd and Ti, and the out-diffusion of In is easier than that of P. The effects of the alloying temperature and time on the specific contact resistance of the p-InP/Au-Zn system are studied. The lower specific contact resistance, $\rho_c = 2.4 - 2.7 \times 10^{-4} \text{ cm}^2$, is obtained when alloying at 450°C for 2 min or at 350°C for 30 min.

These results indicate that the specific contact resistance strongly depends on the interface "interdiffusion degree." The Zn in the Au-Zn alloy is distributed onto most of the surface layer of the p-InP/Au-Zn system during the evaporation process and heat treatment. This may be one of the reasons for the higher specific contact resistance. (Paper received 10 Jul 84; revised 4 Oct 84.)

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STUDY OF EMISSION PROPERTIES OF La-WC CATHODE AND ITS RESISTANCE TO POISONING
OF OIL VAPOR

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4,
Jul 86 pp 287-292

[English abstract of article by Wang Yongshu [3769 3057 2885], et al., of the
Institute of Electronics, Chinese Academy of Sciences]

[Text] In this paper, an assumption to explain emission properties of the La-WC cathode and its resistance to poisoning of oil vapor is presented and is demonstrated by experiments. In the operating temperature range of the La-WC cathode, lanthanum reacts chemically with tungsten carbide, forming La_2C_3 . La_2C_3 is a good emissive material with a work function approximately the same as lanthanum's and can also combine with lanthanum to form an eutectic. The eutectic easily wets the tungsten matrix and migrates over its surface to form a thin emission film. As a result, the cathode emission is greatly increased. In addition, the La-WC cathode has the capability to resist poisoning of oil vapor, which is the reason that the carbon from the oil vapor reacts with the lanthanum in the eutectic and forms La_2C_3 , also a good emissive material.

(Paper received 1 Apr 84; revised 22 May 85.)

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APPLIED SCIENCES

SOME POINTS ON IMPULSE RESPONSE OF APERTURE ANTENNA--A DISCUSSION WITH HU HANNAN [5170 3352 0589]

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4, Jul 86 pp 293-302

[English abstract of article by Shen Haoming [3088 3185 2494] of the Institute of Electronics, Chinese Academy of Sciences]

[Text] The limitations of the far region Fresnel-Kirchhoff formula in transient problems are discussed. Under the excitation of an impulse, the radiation field has to be evaluated in terms of the precise Fresnel-Kirchhoff formula; otherwise, some important transient features will be lost. (Paper received 12 Jun 85; revised 20 Sep 85.)

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MICROWAVE SYSTEM FOR MEASURING HUMIDITY OF CLASTIC DIELECTRIC ON CONVEYER WITH PROGRAMMABLE COUNTER

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4, Jul 86 pp 279-286

[English abstract of article by Huo Zhendi [3499 4176 2769], et al., of the Department of Electronic Science and Technology, East China Normal University]

[Text] A sensitive linear sensor, suitable for measuring humidity of the clastic dielectric on a conveyer, is presented. A programmable counter is used to improve the measuring accuracy. A dynamic test of this system has been completed on the conveyer at Shanghai Coking Factory. The experimental results are in good agreement with the actual humidity of the coking coal. (Paper received 24 Dec 84; revised 30 Jul 85.)

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APPLIED SCIENCES

IMPLICATION AND APPLICABLE REGION OF IMPULSE RESPONSE OF APERTURE ANTENNAS
IN FAR-FIELD REGION--CONCURRENT COMMENT ON SOME POINTS ON IMPULSE RESPONSE
OF APERTURE ANTENNA

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4,
Jul 86 pp 303-308

[English abstract of article by Hu Hannan [5170 3352 0589] of Shanghai Ship
and Shipping Research Institute]

[Text] In this paper, the term "impulse response of aperture antennas in
the far-field region" is clarified, in that the far-field region referred
to is the actual signal exciting an antenna, not the Dirac delta function
exerted on an antenna for deducing the impulse response. In addition, the
applicable distance range of the impulse response in the far-field region is
determined by the frequency range of the exciting signal.

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APPLIED SCIENCES

ESTIMATE OF EFFECT OF OSCILLATOR INSTABILITIES ON SIGNAL PROCESSING BY MEANS OF MONTE CARLO COMPUTER SIMULATION

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 4, Jul 86 pp 316-320

[English abstract of article by Guo Yanying [6753 5888 3853] of Beijing Institute of Radio Metrology and Measurement]

[Text] The majority of the literature dealing with digital signal processing ignores the effect of oscillator instabilities. This will in some cases lead to an inadmissible design mistake.

In this paper, Monte Carlo computer simulation is used to estimate the effect of oscillator instabilities on signal processing. The key link of this method is generating high quality random number sequence simulating the phase noise of the oscillator. The case of pulse compression performance is discussed as an example in order to clarify: (1) the effect of oscillator instabilities on pulse compression performance, and (2) the requirement of oscillator frequency stability when the tolerance of the system performance is known. Finally, some computer simulation examples are given which will provide reference data for engineering designs. (Paper received 30 Dec 84; revised 16 Jan 86.)

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CSO: 4009/1049

APPLIED SCIENCES

RIDGE TYPE INTERNAL BAFFLE FOR FLUIDIZED BED REACTOR

Beijing SHIYOU HUAGONG [PETROCHEMICAL TECHNOLOGY] in Chinese Vol 15 No 5, May 86 pp 269-277

[English abstract of article by Jin Yong [6855 8673], et al., of the Department of Chemistry and Chemical Engineering, Qinghua University, Beijing]

[Text] The hydrodynamic behavior of a fluidized bed with ridge type internal baffles has been studied. Comparisons between beds with different characteristics, such as bed expansion, bed homogeneity, change of flow region and emulsion phase behavior, have been made by methods including collapse process recording, on-line analysis using a computer, etc.

The results of experiments show that this kind of baffle is capable of controlling the size of the bubbles and improving the quality of fluidization. This is a promising new type of baffle which can extend the range of turbulent fluidization. In addition, a new concept of "generalized baffle of fluidized beds" is suggested in this paper for the first time. (Paper received 30 August 1985.)

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APPLIED SCIENCES

NEW CATALYST FOR XYLENE ISOMERIZATION--JIN-1876 PROVED ITS GOOD PERFORMANCE IN COMMERCIAL APPLICATION

Beijing SHIYOU HUAGONG [PETROCHEMICAL TECHNOLOGY] in Chinese Vol 15 No 5, May 86 pp 301-305

[English abstract of article by Jing Zhenhua [2529 2182 5478], et al., of Beijing Research Institute of Petroleum Processing, SINOPEC]

[Text] The bifunctional Pt-Al₂O₃ mordenite catalyst is capable of converting ethylbenzene into xylene and achieving equilibrium composition of xylene isomers simultaneously. Longterm operational data show it has such outstanding characteristics as high activity, excellent selectivity, long life and good regeneration. (Paper received 17 June 1985.)

PREPARATION OF SOLID SUPER ACIDS OF HETEROPOLY ACIDS

Beijing SHIYOU HUAGONG [PETROCHEMICAL TECHNOLOGY] in Chinese Vol 15 No 5, May 86 pp 277-281

[English abstract of article by Zhou Yanxiu [0719 1693 0208], et al., of the Department of Chemistry, Northeastern Normal University, Changchun]

[Text] Three solid super acids of heteropoly acids have been prepared. They are H₃PW₁₂O₄₀-SbCl₅, H₄SiW₁₂O₄₀-SbCl₅ and H₃PMo₁₂O₄₀-SbCl₅, each having an acid strength, H₀, of below or equal to -14.52.

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EFFECTS OF PROCESS PARAMETER ON CONVERSION OF METHANOL TO GASOLINE IN FLUDIZED BED REACTOR

Beijing SHIYOU HUAGONG [PETROCHEMICAL TECHNOLOGY] in Chinese Vol 15 No 5, May 86 pp 296-300

[English abstract of article by Sun Jun [1327 0193], et al., of Shanxi Institute of Coal Chemistry, Chinese Academy of Sciences, Taiyuan]

[Text] The HZSM-5 catalyst was prepared by first mixing the zeolite with silica gel and then spray drying. The catalyst was used to convert methanol to gasoline in a fluidized bed reactor of 25 mm internal diameter under atmospheric pressure. The effects of reaction temperature and liquid space velocity were studied. Under optimum conditions, the yield of C₅₊ hydrocarbon reached 67.9 percent. This yield and the product distribution are similar to those which the Mobil Company has obtained. (Paper received 10 July 1985.)

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APPLIED SCIENCES

DEVELOPMENT OF HYDROTERPHENYL FOR USE AS HIGH TEMPERATURE ORGANIC HEAT CARRIER

Beijing SHIYOU HUAGONG [PETROCHEMICAL TECHNOLOGY] in Chinese Vol 15 No 5,
May 86 pp 305-309

[English abstract of article by Lu Zhenjiang [0712 7201 3068], et al., of
the Fifth Chemical Plant of Wuxian, Suzhou; Gu Rongkui [7357 2837 7608],
et al., of the Petrorefinery Research Institute, Luoyang Petrochemical
Engineering Company, SINOPEC]

[Text] Hydrogenation of terphenyl was performed under a hydrogen pressure of
5-140 kg/cm² at 220-320°C. The influences of pressure, temperature and time
on the depty of hydrogenation were investigated. The product obtained from a
100 t/y unit was tested and found to be suitable for use as a high temperature
organic heat carrier with excellent characteristics and operable in the liquid
phase at 350°C. The properties of the product are similar to those of
Giloterm-TH, Therminol-66 and Therm-S-900. (Paper received 10 September 1985.)

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CSO: 4009/1035

APPLIED SCIENCES

RESEARCH ON SATELLITE PEAKS IN ELECTRON APPEARANCE POTENTIAL SPECTROSCOPY

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 2, Mar 86 pp 95-103

[English abstract of article by Wu Jinlei [0702 6930 7191], Ye Qing [0673 7230] and Sun Xiaan [1327 1115 1344] of the Department of Radio Electronics, Beijing University]

[Text] In this paper, satellite peaks of Ti and Ni in electron appearance potential spectroscopy are researched. Based on the multiple split theory of atomic energy level and perturbation theory, the relevant energy levels of satellite peaks are obtained and the theoretical curves are given. These theoretical curves are coincident approximately with the experimental ones. (Paper received 24 Jul 84; revised 15 Aug 85.)

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APPLIED SCIENCES

DESIGN OF DOUBLE INJECTION TYPE MAGNETO-DIODE

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 2, Mar 86 pp 104-109

[English abstract of article by Huang Dexing [7806 1779 2502] of the Department of Physics, Heilongjiang University]

[Text] A new design is proposed for a long P⁺IN⁺ type Ge magnetodiode with a high recombination region on one side. The optimal relationship is established between its length (l), depth (d), width (ω) and resistivity (ρ) for designing the Ge magnetodiode: $(\rho/\omega) \times (l/d)^3 = 10.75(\Delta T)^2/(I_0^3 R_{th}^2)$, where ΔT is the limit of chip temperature rise, R_{th} the thermal resistance and I_0 the current flowing through the diode. (Paper received 26 Jun 84; revised 21 Sep 85.)

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APPLIED SCIENCES

ANALYSIS OF FU'S WORK REALIZING MAXWELL'S DEMON*

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 2, Mar 86 pp 135-141

[English abstract of article by Wang Yuzhi [3769 2948 4249], Chengdu Institute of Radio Engineering]

[Text] In 1979, Fu and his colleagues presented their work realizing Maxwell's demon, theoretically and experimentally, in the JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY. Fu declared that a "permanent" current was obtained in their device. This means that a new machine of the second kind of perpetual motion had been invented.

In this paper the author gives a detailed analysis of Fu's work, and the following conclusions have been obtained: (1) In Fu's experiment the object controlled by the magnetic field was the mass-motion of electrons, not the individual electron. A magnetic field did not separate electrons individually into a high-speed group and low-speed group, and, for this reason, it is not a "demon." The process which occurred in the whole experiment was a mass-flowing process of a large number of particles. Therefore, it must belong to the area of thermodynamics. (2) The current flowing in Fu's device is actually the initial velocity current of a vacuum diode. (3) The initial velocity current is in turn a changed form of the Thomson thermoelectric effect, which necessitates a hot tank and a cold tank to work, obeying the second law of thermodynamics. (4) The role of action of the magnetic field is to control the mass-motion of electrons, causing a weak rectification effect in the device. The current should vanish if there is not this effect, as the initial-velocity electrons should eliminate each other. (Paper received 29 Jan 85; revised 14 Nov 85.)

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APPLIED SCIENCES

REPLY TO DISCUSSION ON QUANTITATIVE RESEARCH OF NONLINEAR BEHAVIOR OF SECOND-ORDER PHASE-LOCKED LOOP BY PERTURBATION METHOD

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 2, Mar 86 pp 142-144

[English abstract of article by Lu Yihui [6424 4135 5610] of the Institute of Electronics, Chinese Academy of Sciences]

[Text] In this paper the main issue presented in the author's paper published in the JOURNAL OF ELECTRONICS (Vol 4 No 4, Jul 82) and PROCEEDINGS OF INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (Rome, May 82) on the effects of an unlocked loop on the LFM waveform is further expounded in order to clear up some vague concepts in a discussion published in the JOURNAL OF ELECTRONICS (Vol 7 No 3, May 85). (Paper received 6 Aug 85.)

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APPLIED SCIENCES

AUTO-TRACKING PARABOLIC REMOTE-SENSING ANTENNA WITH DUAL MODE ARCHIMEDIAN SPIRAL FEED

Beijing DIANZI KEXUE XUEKAN [JOURNAL OF ELECTRONICS] in Chinese Vol 8 No 2, Mar 86 pp 145-150

[English abstract of article by Zhou Wenfu [0719 2429 3940], Wang Guoying [3769 0948 5391] and Zhang Rirong [4545 2480 2837] of Shijiazhuang Communications Laboratories]

[Text] In this paper an introduction of an auto-tracking parabolic remote-sensing antenna with dual mode Archimedean spiral feed is given. Theoretical analysis, calculation and experimental measurement are made. The theoretical results are coincident with the measured ones. The results show that this antenna is suitable for remote sensing.

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CSO: 4009/1048

LIFE SCIENCES

EFFECT OF ORAL CONTRACEPTIVE ON BLOOD

Tianjin ZHONGHUA XUEYEXUE ZAZHI [CHINESE JOURNAL OF HEMATOLOGY] in Chinese
Vol 7 No 7, 30 Jul 86 pp 408-410, 448

[English abstract of article by Gu Xigen [7357 6932 2704], et al., of
Shanghai Institute of Planned Parenthood Research]

[Text] The influence of the Chinese Pill No 1 oral contraceptive on blood lipid, coagulation and fibrinolysis was studied in 30 women who had taken the drug for 8-18 (11.5 ± 3.2) years, who were between 35 and 44 (38.9 ± 2.9) years old. The control consisted of 30 women who had not taken any contraceptives. Results showed that the cholesterol, triglyceride and HDL-C levels significantly increased ($P < 0.05$). The erythrocyte sedimentation rate (ESR), packed cell volume (PCV) and hemoglobin showed no significant differences ($P > 0.05$). The prothrombin time (PT), kaolin partial thromboplastin time (KPTT) and platelet count were no different ($P > 0.05$). Fibrinogen and plasminogen levels significantly increased over the control group ($P < 0.001$), while the Antithrombin III level significantly decreased ($P < 0.01$). The possibilities of acute myocardial infarction and thromboembolic diseases are discussed. It is suggested that other contraceptive methods be used alternately.

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LIFE SCIENCES

ABO ANTIGENS IN LEUKEMIA OBSERVED

Tianjin ZHONGHUA XUEYEXUE ZAZHI [CHINESE JOURNAL OF HEMATOLOGY] in Chinese
Vol 7 No 8, 30 Aug 86 pp 457-458, 511

[English abstract of article by Chen Zhong [7115 1813], et al., of the First
Affiliated Hospital, Suzhou Medical College]

[Text] Six cases of weakened blood group antigen are reported. In conjunction with 13 other cases reported in Chinese medical literature, all of these are nonlymphocytic leukemia. Among these cases, 17 involve weakening of the A antigen, while the other 2 cases involve weakening of the B antigen. The authors point out that in such cases the blood of the same group should be transfused if necessary, but O blood should not be given in order to prevent transfusion of a large amount of potent IgG anti-A and anti-B. The authors also suggest that the "agglutinable" erythrocyte count be used for observation of the effectiveness of the transfusion.

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CSO: 4009/3010

LIFE SCIENCES

EFFECTS OF LOW TEMPERATURE ON SPERMATOGENESIS AND INTERSTITIAL CELLS IN MICE-- HISTOLOGICAL AND HISTOCHEMICAL OBSERVATIONS

Hebei ZHONGHUA WULI YIXUE ZAZHI [CHINESE JOURNAL OF PHYSICAL MEDICINE] in
Chinese Vol 8 No 3, 25 Sep 86 pp 165-168, 207

[English abstract of article by Cai Hanjun [5591 0698 4596], et al., of
Liaoning Normal University]

[Text] The testes of 45 mice were exposed to -30°C temperatures for 3 minutes. Two days after this exposure, the spermatids began to collapse and spermatogenesis was inhibited. This inhibition lasted for six weeks, gradually returning to normal from the seventh week. The spermatids and spermatocytes seemed to be sensitive to low temperatures, while the sertoli cells and spermatogonia showed much more resistance to them. Through histological and histochemical observations, the interstitial cells have not shown any changes in form and function. This proves that interstitial cells are very resistant to low temperatures. This paper presents the possibility that low temperatures may be useful for periodic birth control in males.

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LIFE SCIENCES

PRELIMINARY STUDIES OF THE DETERMINATION OF G+C MOL PERCENT OF RICKETTSIAE*

Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 6 No 5, Sep 86 pp 293-296

[English abstract of article by Chen Xiangrui [7115 7449 5605], et al., of the Institute of Microbiology and Epidemiology, Academy of Military Science]

[Text] A comparatively pure Rickettsiae prowazekii E strain, which has not lost its integrity or antigenicity, has been obtained by native megluminae diatrizoate density gradient centrifugation. The purity of the DNA of the E strain obtained by repeated phenol-chloroform extraction has been proven by electrophoresis and UV spectrometry values. The figures of the basic properties of DNA (Mol weight $1\text{--}3 \times 10^7$ daltons, thermal denaturation temperature (T_m): 81.2 and G+C Mol percent: 29.1 percent) are compatible with the results of current published data.

* Project supported by Science Fund of the Chinese Academy of Sciences.

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CSO: 4009/3012

LIFE SCIENCES

STUDY OF ^{147}Pm MUTAGENIC EFFECT ON MARROW CELLS

Beijing ZHONGHUA YUFANG YIXUE ZAZHI [CHINESE JOURNAL OF PREVENTIVE MEDICINE]
in Chinese Vol 20 No 5, 25 Sep 86 pp 283-285

[English abstract of article by Zhu Shoupeng [2612 1108 1756], et al., of the Faculty of Radiation Medicine, Suzhou Medical College, Suzhou]

[Text] The purpose of this study is to ascertain the correlation between the accumulation of the fission product ^{147}Pm in various tissue cells and its possible mutagenic effect. After ^{147}Pm was given to male rats, the radioactivity of tissue samples was determined at different intervals by a homogeneous scintillation counter. As time increased, the ^{147}Pm content in various tissues diminished, with selective retention in a skeleton observed three months after injection. When ^{147}Pm was selectively accumulated in the skeleton, it caused chromosome aberrations in bone marrow cells. Results indicate that the highest chromosome aberration rates induced by ^{147}Pm were in the bone marrow cells of Wistar rats treated with 1 mCi/kg (22.53 ± 1.98 percent), followed by rats treated with 20 $\mu\text{Ci}/\text{kg}$ (10.35 ± 1.68 percent) and last by the control rats (1.37 ± 0.78 percent). There was a positive relationship between the chromosome aberration rates and the intake of ^{147}Pm . Among the types of chromosome aberrations, chromatid deletion was predominant.

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NEW TECHNIQUE FOR INJECTING HETERO-GENE INTO CELL

Hefei ZHONGGUO KEXUE JISHU DAXUE XUEBAO [JOURNAL OF CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese Vol 16 No 2, Jun 86 pp 158-161

[English abstract of article by Tan Shici [7223 4258 1964], et al., of the Department of Physics; Li Zhengang [2621 2182 0474] of the Department of Biology]

[Text] Stabbing holes on cells as small as silkworm eggs with a laser microbeam, the authors succeeded in observing, with high speed and high precision, the focusing facula and diameter of holes, among which the smallest diameter was 1.23 μm . The relationship between the laser power and the diameter of the stabbed holes has been measured. The maximum gain of the laser microbeam system is about 4000. With this technique, it is possible to inject hetero-genes into cells of silkworm egg size.

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